EFUF
2022

Adaptive Measures in Urban Forests

BOOK OF ABSTRACTS

BELGRADE 2022

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EFUF European Forum on Urban Forestry

ADAPTIVE MEASURES IN URBAN FORESTS

24th European Forum on Urban Forestry (EFUF2022)

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Book of Abstracts

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BOOK OF ABSTRACTS ON MYEFUF APP

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The City of Belgrade, Serbia

WELCOME

I am proud that event like this is taking place in our city, which will further raise awareness among people and revive the conversation about this topic, which is of great importance.

EFUF 2022 will be a great opportunity to learn about new practices, to discuss with inspiring practitioners, advanced researchers and sector-leading policymakers on how to improve urban forest management in a rapidly changing world.

By investing in ecology, we are sending a clear message that it is necessary to increase the awareness about the environment, so we can preserve and improve it.

Prof Dr Zoran Radojičić – *Mayor of Belgrade*

EFUF 2022

Organising institutions

- EFUF, European Forum on Urban Forestry
- The City of Belgrade
- University of Belgrade, Faculty of Forestry
- European Forest Institute
- Institute of Forestry Belgrade
- SALA
- CLEARING HOUSE
- IUFRO
- CLEVER Cities
- UrbanByNature

Programme and scientific committees

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- **Prof Dr Cecil Konijnendijk** | University of British Columbia, Canada

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EFUF2022 is facilitated by the members of the International Steering Committee of the European Forum on Urban Forestry.

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Tuesday, 17 May 2022 (Day 0)
Venue: City Hall, Stari dvor, Dragoslava Jovanovica 2, Belgrade

12.00 – 13.00 | **REGISTRATION** - URBANBYNATURE SOUTH EASTERN EUROPE KICK-OFF EVENT

12.30 – 13.30 | **WELCOMING LUNCH AND COFFEE**

13.30 – 15.30 | URBANBYNATURE SOUTH EASTERN EUROPE **KICK-OFF EVENT**

15.30 – 16.00 | **COFFEE BREAK**

16.00 – 18.00 | URBANBYNATURE SOUTH EASTERN EUROPE **KICK-OFF EVENT**

18.00 – 20.00 | **ICEBREAKER**

Wednesday, 18 May 2022 (Day 1)
Venue: Radisson Collection Hotel, Congress Hall, Old Mill Belgrade, Bulevar vojvode Mišića 15, Belgrade

08.30 – 09.30 | **REGISTRATION** OF PARTICIPANTS, COFFEE

09.30 – 11.00 | **OPENING, MODERATOR: ANA MITIC RADULOVIC, CEUS**

- 09.30 – 09.40 Welcome remarks by City of Belgrade, Mayor Zoran Radojičić
- 09.40 – 09.50 Thanks and introduction on behalf of EFUF – Clive Davies, Convenor, EFUF International Steering Group
- 09.50 – 10.00 Introduction to green areas and field trips – Maja Jovanovic, Secretariat for Environmental Protection
- 10.00 – 10.30 Dr Elisabeth Pötzelsberger, European Forest Institute
- 10.30 – 11.00 Luka Sesel (UrbForDan, City of Ljubljana)

11.00 – 11.30 | **COFFEE BREAK**

11.30 – 13.00 | **PLENARY SESSION SERBIAN KEY EXPERTS**

- 11.30 – 12.00 Prof Dr Nevena Vasiljevic, Faculty of Forestry Belgrade
- 12.00 – 12.30 Prof Dr Nenad Petrović, Faculty of Forestry Belgrade
- 12.30 – 13.00 Prof Dr Ksenija Lalović, Faculty of Architecture Belgrade

13.00 – 14.00 | **LUNCH**

14.00 – 18.00 | **EXCURSION TO AVALA, WALKING,** Meeting venue: in front of the Radisson Collection Hotel

18.00 – 19.00 | **EFUF INTERNATIONAL STEERING GROUP** meeting at Radisson Collection Hotel

Thursday, 19 May 2022 (Day 2)
Venue: Radisson Collection Hotel, Old Mill Belgrade, Bulevar vojvode Mišića 15, Belgrade

08.15 – 08.30 | **REGISTRATION** OF PARTICIPANTS, COFFEE

08.30 – 10.00 | **PLENARY SESSION**, CONGRESS HALL

- 08.30 Nerys Jones and Paul Nolan – The Evolution of urban and Community Forests in England - the long and winding road
- 09.00 Haris Piplas – Integrated socio-ecological urbanism experiments for Balkan Cities
- 09.30 Rik De Vreese and Clive Davies – Urban Forests as Nature-Based Solutions: The Sino-European CLEARING HOUSE project

10.00 – 10.30 | **POSTER - LIGHTNING TALKS**, CONGRESS HALL, MODERATOR: PROF DR CECIL KONIJNENDIJK

- Vladan Popović, Aleksandar Lučić, Ljubinko Rakonjac and Sanja Jovanović – Genetic diversity of sessile oak from the AONB 'Avala' area estimated on the basis of acorn morphological traits
- Jerylee Wilkes-Allemann and Rolf Arnold – Trends in Outdoor Recreation – Challenges and Opportunities for Urban Forestry
- Susanne Raum, Monika Egerer and Stephan Pauleit – Urban tree insect pests and pathogens: a systematic review of impacts and emerging risks in a changing climate
- Claudia Becagli, Isabella De Meo and Alessandro Paletto – How can the principles of circular economy be implemented in urban green spaces?
- Marlène Boura – Advantages and limits of urban afforestation strategies for urban wildlife
- Ana Marija Marin, Martina Kičić, Dijana Vuletić and Silvija Krajter Ostoić – Perception of urban green space in Croatia
- Lotte Dijkstra and Gerdy Verschuure-Stui – What makes a Tree Avenue? design, planning, management and policymaking around tree avenues
- Klemen Strmšnik, Matjaž Harmel, Matevž Premelč, Luka Sešel and Maja Bovcon – Developing Urban and Peri-urban Forests Planning and Management Guidelines through a transnational project – What have we learned and what can we share with other cities?
- Rik De Vreese and Natalie M. Gulsrud – The NATURA network – a network of networks in Nature-based solutions for Urban Resilience in the Anthropocene
- Ljiljana Brasanac-Bosanac, Tatjana Cirkovic-Mitrovic, Nevena Cule, Aleksandar Lucic – Policies, measures and instruments for implementation of planning solutions relating to urban forests in Serbia

10.30 – 11.00 | **COFFEE BREAK**

11.00 – 12.45 | **PARALLEL SESSION NUMBER 1**, CONGRESS HALL, THEME: HEALTH AND ENVIRONMENT, MODERATOR: DR JERYLEE WILKES-ALLEMANN

- Ana-Maria Popa, Ioan Cristian Ioja, Mihai Razvan Nita and Gabriel Ovidiu Vanau – Evaluating the potential of tree species to generate health disservices in urban parks
- Priscila Weruska Stark da Silva and Stephan Pauleit – Green infrastructure as a tool to achieve seasonal outdoor thermal comfort in Munich urban squares
- Alessandro Paletto, Claudia Becagli, Alessandro Casagli, Isabella De Meo and Maria Giulia Cantiani – Understanding the use of urban green spaces in the time of COVID-19: an experience from Italy

- Marijana Milutinović, Danijela Đunisijević-Bojović, Stojan Ivanović, Dragana Skočajić, Vesna Golubović-Ćurguz and Marija Marković – Estimation of air quality improvement potential of street trees in the Belgrade metropolitan area - case study of two New Belgrade boulevards

11.00 – 12.45 | **PARALLEL SESSION NUMBER 2**, CONGRESS HALL, THEME: URBAN FOREST TECHNIQUES, MODERATOR: PROF DR BIANCA BAERLOCHER

- Isidora Simović, Jelena Tomićević-Dubljević, Ivana Živojinović, Maja Vujčić Trkulja and Oliver Tošković – Remote sensing tools for assessments of relation between quality of urban green areas and residents' health: Case study from Belgrade
- Paolo Semenzato, Valentina Brasola, Dina Cattaneo and Thomas Campagnaro – Estimating ecosystem services for different urban canopy cover scenarios: an application to the city of Padova (Italy)
- Naomi Zürcher – In Consideration of the Tree: The importance of structure and function in the realization of nature-based planning and Ecological Design
- Thomas Campagnaro, Yoan Paillet, Dina Cattaneo and Paolo Semenzato – Tree-related microhabitats in urban areas: preliminary results from urban parks in Padova (Italy)
- Milka Glavendekic and Uros Jakovljevic - Outbreaks of non-native Insects in Urban Forests in Serbia

11.00 – 12.45 | **PARALLEL SESSION NUMBER 3**, FIRST FLOOR MEETING ROOM, THEME: CASE STUDIES, MODERATOR: NERYS JONES

- Udov Maks and Udovč Tin – Save Our Existing Living Urban Trees
- Jasmine Cardozo Moreira and Robert Burns – An urban land reclamation project resulting in social and economic benefits: Lake of Olarias in Ponta Grossa, Brazil
- Maddalena Scalera – Planning urban forests. Regulations and autonomies
- Anjoulie Brandner and Christoph Schunko – Planning and managing public urban green spaces for urban wild food foraging
- Péter Csépányi, Gergely Lomniczi and István Rittling – Two decades of urban forestry around Budapest

12.45 – 14.00 | **LUNCH**

14.00 – 18.00 | **EXCURSION TO ROYAL FAMILY COMPLEX, DEDINJE,**
Meeting venue: in front of the Radisson Collection Hotel (back at the Hotel around 18:00)

19.30 – 23.00 | **SOCIAL DINNER,** Meeting venue: in front of the Radisson Collection Hotel (bus transfer)

Friday, 10 May 2022 (Day 3)
Venue: Radisson Collection Hotel, Old Mill Belgrade, Bulevar vojvode Mišića 15, Belgrade

08.15 – 08.30 | **REGISTRATION** OF PARTICIPANTS, COFFEE

08.30 – 11.00 | **PARALLEL SESSION NUMBER 4**, CONGRESS HALL, THEME: COMMUNICATING IN THE URBAN FOREST, MODERATOR: PROF DR ALAN SIMSON

- Clémence Dirac and Laura Ramstein – Trees management: Switzerland wants to create synergies between urban areas and forests
- Johan Östberg and Gustav Nässlander – How to organize, market and get acceptance for a large-scale tree planting campaign in a public housing area?
- Barbara Darr and Oliver Balke – The role of foresters in urban forests
- Robert Hostnik, Boštjan Hren – Communicating the Urban Forest: An Inside Narrative
- Martina Kičić, Ana Marija Marin, Dijana Vuletić, Silvija Krajter Ostoić – Co-creation of new knowledge through exploring perception and use of cultural ecosystem services of urban green infrastructure in the city of Zagreb, Croatia
- Roddy Shaw – Tree Cities of the World: a framework for progress, policy and professionalism
- Stefanie Steinebach – Do you have to turn the forest into money?

08.30 – 11.00 | **PARALLEL SESSION NUMBER 5**, MEETING ROOM FIRST FLOOR, THEME: CLIMATE AND SUSTAINABILITY, MODERATOR: DR RIK DE VREESE

- Eleonora Franceschi, Martin Honold, Astrid Moser-Reischl, Mohammad A Rahman, Stephan Pauleit, Hans Pretzsch and Thomas Rötzer – Influence of urban environment and climate change on tree growth of common urban tree species in Munich, Germany
- Marija Cvetinović, Nataša Đokić, Mirjana Utvić and Tanja Adnađević – Urban forest, a crucial element in climate change adaptation in cities – Belgrade case study
- Andrea Gion Saluz, Axel Heinrich, Tal Hertig and Stefan Stevanovic – Climate Species Lists – A combination of Methods for Urban Areas
- Dominik Kopeć, Łukasz Sławik, Alicja Gadawska and Martyna Wietecha – Remote sensing as a tool supporting urban greenery management from the continental to the city scale
- Konstantina Koulouri, Carlotta Conte, Bulent Ozel, Marko Petrovic, Oguzhan Yayla, Axel Nilsson and Gurden Batra – Trees as Infrastructure (TreesAI) A platform to value and invest in Nature: Carbon and beyond
- Mohammad A Rahman, Eleonora Franceschi, Astrid Moser-Reischl, Thomas Rötzer and Stephan Pauleit – Influence of Urban Green spaces in reducing thermal heat load across spatial and temporal gradient
- Paolo Viskanic, Gianluca Antonacci, Francesco Ferrini, Alessio Fini, Alice Pasquinelli and Piotr Wezyk – LIFE URBANGREEN: efficient urban green management tools for adaptation to climate change

08.30 – 11.00 | **PARALLEL SESSION NUMBER 6**, CONGRESS HALL, THEME: URBAN FORESTY AND SOCIETY, MODERATOR: CHRIS BAINES

- Jelena Tomićević-Dubljević, Arne Arnberger, Ivana Živojinović and Nevena Nikolić – A comparative study between Belgrade and Vienna on resident's attitudes on health effects of urban green spaces
- Jurij Kobe, Tina Simoncic, Robert Hostnik, Matjaz Harmel, Luka Sesel and Samo Skerjanec – Building capacity: Applying co-governance model in urban forest of Ljubljana, Slovenia
- Eugenia Vidal-Casanovas and Laura Cid – Llobregat & Co-living co-creation laboratory: AMB contribution to the H2020 CLEARING HOUSE Project.
- Erdoğan Atmiş, Cihan Erdönmez – Public Participation in the Management of Urban Forests: Ecosystem Based Management Plan Prepared by Local People
- Isabella De Meo, Claudia Becagli, Maria Giulia Cantiani and Alessandro Paletto – Exploring citizens' attitudes toward peri-urban forests in the era of pandemic emergency
- Rita Sousa-Silva, Elyssa Cameron, Alain Paquette – Planting thousands of trees is great — but only if we do it right.
- Colm O'Driscoll, Ilaria Doimo, Corina Basnou, Maria Chiara Pastore – Uforest Alliance to promote innovation capacity among universities, cities, and businesses to deliver a new interdisciplinary approach to UF in Europe.
- David Elliott, Klaudija Alasauskaite and Donath Kwitonda – Growing Life Skills: Nursery Development and Tree Planting in Urban Rwandan Schools.

11.00 – 11.30 | **COFFEE BREAK**

11.30 – 12.45 | **CLOSING SESSION**, CONGRESS HALL

- 11:30 Clive Davies and Bianca Baerlocher – conference summary, 2022 European Young Urban Forester of the Year Award, Report from the international steering group, Launch of new EFUF website.
- 12:00 Closing Talk: Prof Dr Cecil Konijnendijk – The 3-30-300 rule

12.45 – 14.00 | **LUNCH**

14.00 – 17.00 | **EXCURSION TOPČIDERSKI PARK, UŠĆE AND FRIENDSHIP PARK,**
Meeting venue: in front of the Radisson Collection Hotel at 14.00 pm (by bus)

17.30 – 20.00 | **BOAT RIDE**, CONCLUDING SNACK

Saturday, 21 May 2022 (Day 4)

08.30 Bus leaves from Radisson Collection Hotel for Excursion

09.30 **POST-CONFERENCE EXCURSION:** Museum of Srem, Sremska Mitrovica, Zasavica, Vojvodina

19.00 Arrival at Belgrade

Venue and Excursion Sites

The City of Belgrade is pleased to announce the 24th European Forum on Urban Forestry (EFUF). The Forum will be held from May 17 - 21 in Belgrade, Serbia.

Avala Mountain

The Avala Mountain in Belgrade

Avala is a mountain near Belgrade and it provides an amazing panoramic view of the city, as well as of Vojvodina and Sumadija. It stands at 511 meters above sea level.

This beautiful area is a low type of the Pannonian island mountain. Until 600.000 years ago, when the surrounding low areas were flooded by the Pannonian Sea, Avala was an island.

There was mining active on the mountain at 3,000 BC. Glory Avala is famous because of the mineral avalite that was found here. A greenish mineral, chromian, magnesian or potassic alumosilicate was discovered by Serbian chemist Sima Lozanic who established its formula.

The mountain has been protected since 1859 as a natural monument. In the modern age, plans for mountain preservations were made in 2007 and that way Avala entered a circle of protected green areas of Belgrade. Those protected areas of Avala spread over 48,913 hectares. Some of them are additionally protected. The complex of mountain beech, oak, maple and elm have the highest level of protection.

The greatest wealth of Avala today is the flora, fauna and clean air. There are over 600 plant species on the mountain. Some of them are protected by the law as natural rarities, such as types of laburnum, box tree, black broom, common holly and martagon lily. This area is also abundant in medical herbs, like the early-purple orchid and belladonna.

Almost 70% of the mountain is forested. High woods mostly consist of durmast oak, Turkey oak, hornbeam, beech, linden, black pine and black locust.

Animal life is also very rich in Avala. Almost 100 species of birds live here, including strictly protected Eurasian sparrow hawk, European honey buzzard and European green woodpecker. One section of the mountain is organised as a game hunting ground.

Avala also contains numerous landmarks. This area is great for recreation, taking a walk, hiking (hiking trail "Sakinac"), or just relaxing and enjoying clear and fresh air.

Royal Family Palace

The Royal Palace (Serbian: Краљевски двор / Kraljevski dvor) is the official residence of the Karađorđević royal family. The Royal Palace was built between 1924 and 1929 with the private funds of His Majesty King Alexander I (the grandfather of HRH Crown Prince Alexander). It is the main building in the Royal Compound, part of the Dedinje neighborhood of Belgrade. Designed by Živojin Nikolić and Nikolaj Krasnov, the palace is an example of Serbo-Byzantine Revival architecture.

Royal Family Palace, Belgrade

The Royal Family, Belgrade

Today, the palace is home to Crown Prince Alexander, Crown Princess Katherine and Alexander's three sons and one grandson.

Zasavica - Special Nature Reserve

Picturesque change of forests, wet meadows, wide shores and water, richness of plant and animal species, traditional way of life on the river painted through folklore and everyday life, historical heritage dating back to ancient times, provides visitors all year round very rare, attractive and unique tourist facilities.

Zasavica nature reserve, Belgrade

Topčider Park

In the oldest Belgrade Park in the Topčider river valley, besides exuberant greenery you can also see Belgrade's rich history. Some of the buildings that were once built there no longer exist, but you can enjoy the greenery, peacefulness and preserved nature located just a few kilometres away from the city centre.

Topčider Park, Belgrade

The main site of the park is the Residence of Prince Miloš, which combines the Balkan and oriental style, with authentic furniture and portraits of significant figures throughout the 19th century, bringing back memories from the time when Prince Miloš Obrenović lived there. Today this historical building, which treasures the authenticity from the time when the Obrenović family lived there, can be visited any day of the week. One of the oldest and most beautiful platanus trees in the whole of Europe can be found in front of this building. It is officially protected, being claimed as a natural rarity (about 180 years old). The tree was planted at the time when the building was being constructed and its circumference amounts to almost around 7.5 meters.

Friendship Park

More than five decades after its formation in 1961, the Friendship Park is still a unique park in its concept of creation. This place is connected to the First Summit of the Non-Aligned in Belgrade and the visit of the highest statesmen of the world. It keeps the memory of important events and personalities of Yugoslav and world history of the second half of the 20th century.

Friendship Park, Belgrade

Confluence Sava and the Danube

Panoramic sightseeing of Belgrade from the Danube and Sava

Confluence Sava and the Danube, Belgrade

Sunset in Confluence Sava and the Danube, Belgrade

Plenary Session

LOCATION: CONGRESS HALL

DURATION: 08.30 – 10.00

The Evolution of Urban and Community Forests in England – the long and winding road

Paul Nolan[a] and Nerys Jones[b]

Institution: [a]The Mersey Forest (United Kingdom); [b]Strategic Greenspace Consultant (United Kingdom)

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Keywords: *Community Forests, Urban Forestry, Forest Policy, Long Term Planning*

The Community Forest Programme in England emerged from the de-industrialisation of many parts of England in the late 1970's and through the 80's. Large areas of poor-quality landscape in and around towns and cities were seen to be a drag on the drive to regenerate these areas. Forestry and Community Forestry, were seen as possible effective and relatively low-cost mechanisms to improve environmental quality, tackle vacant and derelict link and engage local communities. Forest Plans were prepared for 12 areas in England.

Over the next 30 years the programme of Community Forests has been through several cycles of strategy and policy support. Some Forests have ceased operating, but new Forests have joined from related programmes.

Recently, three new Community Forests have been approved, with the probability of a further two Forests coming into the group by 2025.

The Community Forests have weathered 30 years of change and find themselves at the heart of national policy and helping to deliver the government targets for new woodland establishment to meet the UK net zero targets. Whilst the current cycle of support is positive, the Forests also are looking forward to refresh their targets, objectives and ways of working through to 2050. England's Community Forests provide a case study of adaptive organisations, working over extended time periods in step with the time required to plan, plant and manage Urban and Community Forests.

Integrated socio-ecological urbanism experiments for Balkan Cities

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***Keywords**: urban laboratories, experimental urban practices, transdisciplinary method*

Looking into recent history: in the latter half of the twentieth century, cities in the Western Balkans (WB) represented urban laboratories as places for experimental practices within urban space, attempting to apply the socialist ideals to the practice of city-making. Today, the majority of urban planning instruments from this era are still prevalent despite the social realities exhibiting clear discrepancies between inherited practices and future development aspirations. In addition, cities in the WB share similar urban histories and spatial patterns, experiencing a socio-economic and political transition, including a technical revolution and severe effects of climate change.

Such changes require the re-examination of spatial planning approaches. Urban development of cities in the WB requires more flexible urbanistic approaches. Planning must be oriented on a practical application of adaptive management and integrated development. In the context of the overall economic and environmental crisis a detailed analysis of the potentials and needs of existing urban infrastructure, public spaces and inclusion of its users.

Green and Blue infrastructures possess immense potential for proactively improving the sustainability of cities because of their direct connection to urban natural systems, which would also enhance the socio-cultural and political implications of constructed space. Therefore, urban transformations need to become more flexible and adaptable offering important services for the city which would also enhance the socio-cultural and political implications of constructed space by integrating urbanism, ecology and social sciences. Therefore, the WB cities require a multi-scale, multi-functional and inter-disciplinary approach for designing and planning to adapt to the needs of a peak-oil society. The paper will analyse self-executed experimental approaches conducted in urban laboratories in the Balkans and Eastern Europe, where these innovative applied research methods were utilized, including:

- Integrative transdisciplinary method analysing of complex sites that link the planning level with the design of green and public spaces.
- Novel co-creation techniques that respect the complex relationships and hierarchies between urban instruments, processes and stakeholders.
- Rollout of urban strategies through green space and the built environment in a holistic manner.

CLEARING HOUSE - urban forestry as a nature-based solution

Clive Davies[a] and Rik De Vreese[b]

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Keywords*: Nature based solution, CLEARING HOUSE project, HORIZON 2020, Urban forestry, China Europe, Systematic review, Governance institutional and economic frameworks*

Urban forests are considered as a valuable nature-based solution which can amongst others improve urban health and well-being and assist in the amelioration of climate change impacts. Trees are one of the most ubiquitous features of urban landscapes across all global regions although their condition and distribution is variable. Created and managed to deliver a wide spectrum of ecosystem services they can be harnessed to facilitate sustainable urban development. The CLEARING HOUSE project funded by the European Commission's Horizon 2020 programme is a major initiative 4-year project involving both Chinese and European partners whose objective is to analyse and develop the potential of UF-NBS to meet contemporary challenges. This presentation will cover the state of the art of urban forests as a nature-based solution based on the project first-tier analysis and project deliverables undertaken and produced between 2019 and 2021. There are substantive and interesting outcomes to report. This includes a focus on typology, case studies, governance, institutional and economic frameworks and societal perceptions. The presentation will also look forward to the anticipated outcomes already in development including work on business models and investment cases and thematic guidelines.

Poster Session

LOCATION: CONGRESS HALL

MODERATOR: PROF DR CECIL KONIJNENDIJK

DURATION: 10.00 – 10.30

Genetic diversity of sessile oak from the AONB "Avala" area estimated on the basis of acorn morphological traits

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Keywords: *population, acorn, variability, gene pool*

Natural sessile oak populations in forest stands on the territory of the city of Belgrade are found on small areas and their survival is endangered by climate change, small population size, low species competitivity, etc. Therefore, auxiliary reforestation measures are recommended, along with broadening their gene diversity. Although knowledge about level and genetic diversity structure are a precondition of its successful conservation and usage, the research of this topic in these forests' sessile oaks is so far insufficient. To preserve the present sessile oak gene pool in population on the area of outstanding natural beauty (AONB) "Avala", and controlled usage of genetic resources, the intrapopulation variability research has been conducted, based on morphological acorn traits.

In October 2019, 50 trees of the highest quality and good health condition were selected, forming the basis for sessile oak (Quercus petraea (Matt.) Liebl) reproductive material production. From each tree cc 3kg of ocularly healthy and undamaged acorns were collected. From the 50 acorns as samples, length, width and acorn weight were measured. Based on measured length and width values, the volume and acorn shape index were calculated. The average values of morphological traits from the research indicate high variability between the examined genotypes. It was confirmed by analysis of variance, where the statistically significant differences between sampled maternal trees for all investigated morphological acorn traits were determined ($p<0.01$; $\alpha = 0.05$). Based on the obtained results, it can be stated that the available sessile oak gene pool is characterized by satisfying level of genetic variability.

The obtained results should be accepted as preliminary ones, which can serve for forming adequate protected natural good management plans, with the aim of long-term preservation and progress of ecological adaptability and evolutionary potential of sessile oak population. In addition, they also provide the necessary measures being made for sessile oak genetic resources preservation by in situ and ex situ conservation methods.

Trends in Outdoor Recreation – Challenges and Opportunities for Urban Forestry

Jerylee Wilkes-Allemann[a] and Rolf Arnold[a]

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***Keywords**: Switzerland, Outdoor Recreation, Urban Forestry, Ecosystem Services*

Urban Forests are an important element of urbanized societies as they provide several ecosystem services. One of these services is the cultural ecosystem service which includes active and passive recreation activities. Existing active forms (e.g., E-Mountain bike) have gained importance in the last decade. New active (e.g., plogging, trail running) and new passive (e.g., Forest Bathing) forms of recreation activities have evolved and have been becoming very popular in the last five years. It is expected that these new forms of recreation activities will challenge urban forestry, but also create new opportunities.

In this study we aim to: (i) identify evolving urban forest recreation activities, (ii) identify the challenges that these will pose to urban forestry, and (iii) identify the opportunities that these activities bring along for urban forestry. To do so we choose Switzerland as an example, as cities are increasingly urbanised. Our research is based on several empirical sources including semi-structured interviews, social-media analysis and document analysis.

Urban tree insect pests and pathogens: a systematic review of impacts and emerging risks in a changing climate

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Keywords: *urban forests, trees, disturbances, impacts, risks*

Trees contribute greatly to urban society and human well-being. A healthy canopy cover of the urban forest (i.e., all trees within an urban area), for instance, is vitally important to adapt to raising temperatures. Yet relatively little is known about how the growing incidences of tree insects and pathogens affects the ability of urban trees to make these contributions. To address this issue, we undertook a systematic review and synthesis of the diverse global empirical evidence on urban tree insect pests and pathogens spanning several decades, using Scopus, Web of Science, and Science Direct databases.

Following screening and appraisal of over 3000 articles from a wide range of fields, 100 studies were conceptually sorted into a three-part framework: environmental impacts, including changes in soil elements due to tree mortality; economic impacts, mainly the costs associated with pest and disease outbreaks; social impacts, like visual changes, potentially also leading to behavioural changes (e.g., outdoor recreation). A good understanding of these impacts and emerging risks, particularly in the context of climate change, is key for effective forward urban green infrastructure governance and planning.

TREEPACT, the project under which this literature review was undertaken, has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 101023713.

How can the principles of circular economy be implemented in urban green spaces?

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Keywords: *Sustainable Development Goals (SDGs), Public green spaces, Green infrastructures, Urban forests, Ecosystem services*

On 25 September 2015, the international policy makers adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 Sustainable Development Goals (SDGs) supported by 169 targets. The SDGs are intended to end poverty, protect all that makes the planet habitable, and ensure that all people enjoy peace and prosperity, now and in the future. In other words, the main objective of SDGs is to integrate the three pillars of sustainability (environmental, economic, social) with a harmonious relationship between human society and natural resources. The SDG11 "Sustainable cities and communities" emphasizes the social importance of providing universal access to safe, inclusive, and accessible, green and public spaces (outcome target 11.7) and to reduce environmental impact of cities by paying special attention to air quality and waste management (11.6).

To achieve these ambitious targets, urban green spaces (UGSs) will increasingly play a key role in the coming decades providing many ecosystem services for the well-being and health of urbanized people. In this context, the concept of circular economy – defined as an economy system where the value of products, materials and resources is maintained for as long as possible, and the generation of waste minimized (EC, 2015) – can be applied to UGSs with the aim to improve the provision of all categories of ecosystem services and to minimize waste and greenhouse gases (GHGs) emissions. The present study was conducted within the FOR.CIRCULAR project funded by Italian Ministry of Ecological Transition. The main objective was to develop a set of Criteria and Indicators (C&I) useful to apply the principles of circular economy to the UGSs management.

The theoretical framework is addressed to manage the urban green infrastructures with the aim to reuse and recycle the by-products deriving from these areas and to increase the CO2 sequestration and storage in the long-term period. In particular, the proposed C&I focused on the CO2 sequestration of urban green spaces (included in the regulating services category), the ecological and economic valorisation of wood waste for energy purpose (provisioning services), and the improvement of UGSs using infrastructures made with eco-sustainable and recycled materials (cultural services). The set of indicators defined by this study can be implemented in different towns and cities, to improve the UGSs management in accordance with the principles of the circular economy.

Advantages and limits of urban afforestation strategies for urban wildlife

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Keywords: *afforestation, forestry, urban planning, urban ecology, wildlife*

The urban population is growing across the world and cities are facing increasing challenges due to the ongoing climate change and the sharp decline in biodiversity. Planting trees in cities is becoming more popular to improve human well-being and mitigate the externalities of climate change within urban ecosystems. Yet afforestation has multiple and complex implications in urban areas. These strategies are primarily anthropocentric: the urban forest is seen as a leverage for improving human well-being by providing social, aesthetic, health, or ecological benefits (among others). However, the impact on other living beings is not well understood, nor is it considered a key component in the decision-making process in most studies and implementations.

The urban forest is home to many species. Albeit being generally positive, not all afforestation strategies consider how they affect urban wildlife. Also, not all species directly depend on vegetation for their survival. Aspects that need to be considered, when creating or improving a green space, include pre-existing human influence such as noise levels or light pollution for instance.

In this study we question the current knowledge on the benefits of afforestation for urban wildlife, and to what extent they are considered when implementing urban forestry programmes. In this perspective, we analyse existing knowledge and practices via a systematic review of the literature on urban forestry and the benefits that afforestation strategies provide to wildlife.

The current ecological crisis is multifaceted, but the urban forest can serve as a powerful nature-based solution. The ecosystem services it provides are multiple and, if adequately understood and addressed, can play an important role both for human well-being and for urban wildlife. The aim of this research is to identify gaps in the literature and practice, to provide guidelines for urban planners and landscape architects involved in the decision-making process. Guidelines for the implementation of urban afforestation programmes should bring to the same level impacts on climate change mitigation and biodiversity conservation.

Perception of urban green space in Croatia

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Keywords: *Urban green space, Perception, Residents, Participation, Covid-19*

The recent COVID-19 pandemic has shown the importance of urban green spaces for citizens and their mental health, especially during lockdown periods, highlighting the importance of green spaces for residents around the world.

Perception and attitudes of urban green space by residents were explored using an online survey during the lockdown period in Croatia. Differences in attitudes and perceptions of green spaces between people living in large and small settlements were analysed.

Results showed that maintenance of existing as well as planning of future urban green areas are very important to respondents regardless of them living in small or large settlements. Most respondents emphasized the importance of having the nearest green area within a radius of 300 m from home. Respondents in small settlements, more than in large, are content with the aesthetic appearance of green areas they visit. In large settlements, residents stress the importance of having accessible public green space, while residents in small settlements prefer the presence of private green areas. Both would like to improve cleanliness (waste collection) in green areas they frequently use. Regardless of the size of the settlement, respondents wish for more green areas, more trees, better maintenance, especially of older trees. They also perceive a need for improvement of recreational areas, such as providing dog areas, children's playgrounds, sports equipment, benches, tables, and waste bins.

This research showed the importance of urban greenery in the everyday life of residents, especially in times of crisis. The collected data enabled a better understanding of the relationship between people and green spaces, especially regarding the different perceptions and needs of residents of different settlements in Croatia. These results are a good background for future research in Croatia and the region, knowledge gathered from them should be used to improve the management of green spaces according to the needs of residents.

What makes a tree avenue? Perspective on design, planning, management and policy-making around tree avenues

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Keywords: *Tree avenues, Avenues, Allees, Green infrastructure, Perspectives, Integral road design, Integral road planning, Integral landscape design, Integral landscape planning*

Headlines about citizens protesting the felling of large numbers of trees along roads are frequent in the Netherlands. Although tree felling is often seen as a solution to increase road safety, trees and roads are inextricably linked. The book 'Tree Avenues. On the inextricable relation between trees and roads' addresses the various aspects: from cultural history, planting schemes, ecology, and climatology, to developments in technical tree matters and road safety. The book is a guideline for anyone who wants to understand the broad importance of tree-lined avenues and is a must for everyone who works with them. Multiple scientists, experts and policymakers who deal with tree avenues daily wrote the chapters. The aim is to contribute to the dialogue between the different stakeholders and protect tree-lined avenues. Not rigidly, but with knowledge, insight and creativity. In this time of climatic change, this is more important than ever.

Tree avenues, avenues or allees are often described as roads with planted trees on both sides of the roadway. Although this description lists the most prominent elements of a tree-lined avenue, the multiple values of these avenues are not indicated. Values such as experience, ecology, climatology and cultural history are not considered. A better understanding of tree avenues emerges when experts from various fields are consulted. Landscape architects emphasize the human experience and relationship with the landscape. Traffic engineers consider the avenue of trees as a through traffic route. Considering the global climate crisis, we are learning more and more about the ecology and microclimate contributions that tree-lined avenues generate. The past plays a role in regional identity, and avenues have monumental value from cultural history. These aspects are all essential for the design, planning, management, and policymaking of tree-lined avenues but are not reflected in the current definition. We consider that a loss. Therefore, the book presents thirteen chapters by academics, practitioners, and policymakers, illustrating various aspects to better understand and appreciate avenues.

The book will be published in Dutch in March 2022. An open-access English translation is planned. EFUF 2022 is an opportunity to share the multi-faceted new perspectives on tree avenues by presenting a new, integral definition of tree avenues, illustrated by a selection of examples from The Netherlands.

Developing Urban and Peri-urban Forests Planning and Management Guidelines through a transnational project – What have we learned and what can we share with other cities?

Klemen Strmšnik[a], Matjaž Harmel[a], Matevž Premelč[a], Luka Sešel[b] and Maja Bovcon[b]

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Keywords: *Urban and Peri-urban Forests, URBforDAN Project, Urban Forest Planning and Management Guidelines, Participatory Planning, Participatory Management, Transnational Cooperation, Lessons Learned, Pilot testing, From Theory to Practice*

Urban and Peri-urban Forests (UPFs) are under increasing pressure from the ever-increasing number of users and the ever-expanding set of activities. Without proper cooperation between all key actors – owners, managers and users of UPFs – conflicts and unsustainable use of forests arise. If unaddressed, such situations can quickly escalate and are usually reflected in the poor state of UPFs. In some cities, the management of UPFs is further challenged by extremely fragmented ownership.

This is why seven cities – Ljubljana, Vienna, Budapest, Zagreb, Cluj-Napoca, Belgrade and Ivano-Frankivsk joined forces and decided to improve management and utilization of their UPFs through the URBforDAN project – a transnational project implemented under the INTERREG Danube Programme framework.

Furthermore, they set out to achieve a tangible transnational impact by designing a set of tools and methods, tested on 11 pilot UPF areas reflecting diverse ecological, political, legislative, operational and cultural environments, as well as monitored through a comprehensive documented learning process. All experiences, results and lessons learned were collected in Urban and Peri-urban Forests Planning and Management Guidelines.

They were developed as a stand-alone type of awareness raising tool and as the implementation guide for any city interested to transfer the URBforDAN approach and follow the example of URBforDAN cities.

Guidelines actively promote cooperation between all key actors, equip them with needed knowledge, and practical experience. They offer a comprehensive representation of the planning process, as well as of applicative use of ecosystem services in urban environment and participatory involvement of all key actors – developed, tested and implemented on a city level. So far, no similar tool or guide devoted to cities existed.

As such they represent a new standard in sustainable urban planning and management of UPF, and a best practice example of how cities can use their UPF to move from theory to practice on climate change issues and improve the wellbeing of their citizens.

What have cities learned through this process? How stimulating, efficient and effective can the framework of a transnational project be? How successful were seven cities in the implementation of a unified approach? How transferable proposed solutions really are? How can cities benefit from Guidelines? All these questions and more will be addressed in this oral presentation.

The NATURA network – a network of networks in Nature-based solutions for Urban Resilience in the Anthropocene

Rik De Vreese[a] and Nathalie Gulsrud[b]

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Keywords: *urban resilience, Anthropocene, urban ecosystems*

Urbanised regions are being exposed to changing climate, including more frequent and more intense heat waves and sea level rise. Traditional engineered infrastructure, such as stormwater drainage systems or sea walls, is usually designed for only one purpose and seldom can adapt to changing conditions. Nature-based solutions (preserving protective ecosystems including urban forests, or incorporating ecological elements such as trees), offer flexibility in the face of changing conditions and provide multiple benefits to society, often at relatively low cost.

The Nature-based Solutions for Urban Resilience in the Anthropocene (NATURA) project links networks in Africa, Asia-Pacific, Europe, North and Latin America, and globally to enhance connectivity among the world's scholars and practitioners and improve the prospects for global urban sustainability. NATURA exchanges knowledge, shares data, and enhances communication among research disciplines and across the research-practice divide to advance urban resilience in face of growing threats of extreme weather events. As an important part of knowledge sharing, researchers and practitioners will work together on applications of nature-based solutions (NBS) in a wide range of social, ecological, and technological contexts.

Through all-hands meetings, thematic working groups, regional nodes, and synthesis writing workshops, NATURA will accomplish the goals of synthesis and data sharing, and network coordination. Early-career researchers and practitioners will be sponsored by NATURA to pay five-week visits to network partners (yearly deadlines on 1 May and 1 November). Further, NATURA will train postdoctoral scholars and graduate students through learning exchanges to networks around the globe. Through collaboration with partners, international students will be invited to participate in these exchanges.

The European Forum on Urban Forestry is part of the NATURA network of network. People associated with EFUF are eligible to participate in the events organised by NATURA and are eligible for the fellowships offered by NATURA.

More information at www.natura-net.org.

Policies, Measures and Instruments for Implementation of Planning Solutions Relating to Urban Forests in Serbia

Brasanac-Bosanac Ljiljana[a], Cirkovic-Mitrovic Tatjana[a], Cule Nevena[a], Lucic Aleksandar[a]

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Keywords: *urban forests as nature-based solutions, urban planning, nature-based solutions*

The problem of the urban forests in cities is very complex. The central parts of cities are compact, and the space is limited, so there are considerably less possibilities for inhabitants to gain an easy and quick access to the urban forests. To implement solutions relating the urban forests in the cities of Serbia, it is necessary to apply the land and utility policy, environmental protection policy, as well legal, planning, organizational, economic-financial and technical measures and instruments application.

Legal measures and instruments, among other things, include making various decisions, such as the Decision on the use of urban construction land and the procedure for giving land for use, the Decision on determining land that is not considered urban construction, etc.

Planning measures and instruments - their formulation and adoption enable planning solutions to be included into many decisions that are binding for institutions, economic entities, and even the citizens themselves within the Republic and local communities.

Economic and financial measures and instruments include defining the financial sources for the implementation of plans and programs; defining the fee for the use of public greenery and urban forests as a communal city facility; financial interventions of municipalities; providing favourable investment loans; reduction of tax liabilities for those legal and natural persons that specifically contribute to the improvement of vegetation and greenery and implement some of the planned measures in this area; obliging companies whose activities endanger green areas to allocate certain funds intended for the improvement of the environment, etc.

Organizational measures and instruments include the development of various action plans and programs for raising and arranging urban forests (Afforestation Action Plans, Programme of Intervention Measures for Rehabilitation of Endangered Public Urban Forests; Programme for Reconstruction of Improperly Arranged Urban Forests; City Planning Program, etc.); exemption from more intensive use of urban construction land of those undeveloped areas in urban areas that can be used for other purposes - greenery, etc.

Technical measures and instruments include updating the state of the Cadastre and the state of land ownership; providing funds for the implementation of the program (for providing planting material, for raising and establishing forests, as well as for nurturing and protection of newly created plantations); establishment of monitoring systems and biomonitoring systems, etc.

If the urban forests management is harmonized from the local to the republic levels, development goals and interests are determinized, make appropriate decisions and implement these policies, measures and instruments, the necessary norms for distribution of urban forests in urban centres in Serbia would be established.

Session 1

Health and Environment

LOCATION: CONGRESS HALL

MODERATOR: DR JERYLEE WILKES-ALLEMANN

DURATION: 11.00 – 12.45

Evaluating the potential of tree species to generate health disservices in urban parks

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Keywords: *ecosystem services, urban parks, allergenicity, invasive species, Romania*

Urban parks have an important role at the city level through the multitude of services they bring. As ecosystem services, they fulfil both production, support, regulating and cultural functions. However, species diversity and park planning do not always bring only benefits. Sometimes from careless planning, species can cause problems in green spaces such as parks and their proximity. The aim of our paper is to evaluate the disservices provided by tree species in urban parks, pursuing three objectives: (1) identifying species diversity and problematic species, (2) identifying the distribution of invasive species and (3) evaluating the allergenic potential of urban parks.

The study area for this analysis is represented by two parks in Bacau (Romania): Cancicov Park and Gheraesti Park. To fulfil the proposed purpose, an application was made in Romanian to collect data from the field. The application used is Survey 123 from the ESRI suite which allowed to collect spatial data and information such as: species name, tree height, canopy cover and other relevant information in the field. Subsequently, the data was processed and analysed by simple statistics, but also by calculating the allergenic potential.

The results indicate a high diversity of species, but also an equally high allergenic potential. There are some invasive species widespread in Europe which are also present in the analysed parks. The study draws attention to the planning of urban parks in terms of the species of trees they have, as in the medium and long term they can lead to health problems for residents, especially allergies. In Romania, the strategic objectives regarding the green spaces and the improvement of the living conditions of the residents usually aim at the beautification of the parks and the management of these spaces.

Green infrastructure as a tool to achieve seasonal outdoor thermal comfort in Munich urban squares

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Keywords: *Urban green infrastructure, Microclimate modelling, Outdoor thermal comfort, Climate-responsive design*

Urban squares are of particular importance in densely built neighbourhoods for provision of thermal comfort, especially in summer conditions. Moreover, there is a lack of knowledge for the design of squares that balances between seasonally varying thermal comfort demands in temperate climates. This research aims to fill this gap by exploring the potential of urban green infrastructure for creation of climate-adapted public squares.

Two different urban squares of Munich were selected to access how typical greening designs and their microclimatic results affect the PET in different seasons of temperate climate. Using ENVI-met model, the squares were analysed in three different weather conditions.

Initial results show that the PET is strongly affected by the H/W ratio in Alpenplatz, overriding the tree shade effect on warm and mild days. On a hot day in mid-summer, the sun access is enlarged, and the effect of the trees' shade can be better observed. The presence of grass combined with the tree shade and H/W ratio was responsible for the better PET values observed in Alpenplatz on the hot day. During the night, the sky view factor is the strongest influence on the PET in all studied scenarios, regardless of vegetation cover.

Due to the highly paved surface and lack of vegetation of Marstallplatz, the simulation results reveal extreme thermal heat stress conditions at critical hours of hot summer days. However, the square has a greater potential to increase human thermal comfort in different seasons, as diverse areas can be created through different forms of greening in response to the demand for thermal comfort in each season, and types of human activities.

The results demonstrated that it is necessary to consider diverse arrangements of vegetation to optimize human thermal comfort throughout the seasons. Urban morphology has a high impact on human thermal comfort in urban squares, regarding the size of the open space that is sun exposed. In small squares vegetation can increase thermal comfort during the summer, however, shading from surrounding buildings outweigh the benefits from greenery during other seasons. Large squares have a higher potential to be used in diverse seasons, offering diverse possibilities for providing human thermal comfort.

In the following stages of this research, typical greening designs and their microclimatic influences during hot, warm and mild days will be tested both during the day and night-time conditions.

Understanding the use of urban green spaces in the time of COVID-19: an experience from Italy

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Keywords: *green infrastructures, habits change, lockdown, outdoor recreation, web-based survey*

Since the end of 2019, the world is facing with the novel coronavirus pandemic disease (COVID-19), caused by the pathogen severe acute respiratory syndrome coronavirus 2. From early 2020, the viral infection has spread rapidly becoming a worldwide pandemic and at date the virus is still circulating with new variants. To contain the spread of this viral infectious disease, national governments have promulgated different kinds of measures and restrictions. Citizens have been required to change their lifestyle using the mask outdoors and indoors, adopting social distancing in public spaces, respecting mobility restrictions that lead citizens to stay at home. These measures had a strong influence on daily activities and behaviours of people, also influencing attendance of urban green spaces. This shift in the use of urban green spaces can be associated to many aspects such as more time available, the need to relax in nature, and the requirement to reduce stress and anxiety.

This study offers insights from a web-based survey observing the use of urban green spaces before and during the two COVID-19 lockdowns in Italy. The study is finalized at enriching the field of research aimed at understanding if citizens' habits are changing due to the restrictions. The study considers a period that includes the first and second wave from February 2020 to February 2021 and the two related lockdowns. The findings of the study have the aim to offer a general evaluation of the main effects of the COVID-19 pandemic on people's perception of green areas. A web-based questionnaire was administered using social media from May to June 2021, at the end of the second wave. At the end of data collection 1,075 questionnaires were collected and processed.

The results show that concerning the visits to green areas during the lockdowns, two main group of persons can be identified. The first group is composed of people who intensified their visits, driven by the desire to spend time in contact with nature. Instead, the second group is characterized by people who was hesitant and averse to spend time in green areas being afraid to be infected. Finally, it is important to emphasize that our findings confirm the modifications induced by COVID-19 in the use of green areas. Now a question arises: this change in the interaction between nature and people will last even beyond the end of the health emergency?

Estimation of air quality improvement potential of street trees in the Belgrade metropolitan area - case study of two New Belgrade boulevards

Marijana Milutinović[a], Danijela Đunisijević-Bojović[a], Stojan Ivanović[a], Dragana Skočajić[a], Vesna Golubović-Ćurguz[a] and Marija Marković[a]

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Keywords: *Air quality, Street trees, Functional of tree*

Air quality problems relative to urban pollution and global temperature increase, affect human health and well-being in cities. Selections of tree species for urban greening projects use to be based on ornamental features of species and their resilience to unfavourable ecological properties of the urban environment. Eco-physiological parameters relevant to estimation of species potential for improving air quality in high emission urban traffic zones should be considered in the tree management process. In this regard, we have analysed almost 1000 street trees in Zoran Djindjić and Mihajlo Pupin Boulevards, in the largest municipality of the Belgrade metropolitan area – New Belgrade. In the analysis we considered: Genus/Species structure and functional traits relevant to ecological impact (e.g., species potential for isoprene and monoterpenes emission, resistance to pathogens) and DBH as an indicative parameter for estimation of potential ecological functions of vital trees.

The most represented tree species, in the Zoran Djindjic Boulevard are Platanus x acerifolia (30,14%), Acer pseudoplatanus (18,77%) and Prunus cerasifera (16,58%). In the Mihajlo Pupin Boulevard, Platanus x acerifolia (79,13%) is dominant street tree and in the second place is Populus x euroamericana with 5,12%. The largest DBH of street trees in Zoran Djindjic Boulevard belonging to the Corylus avellana (130 cm), Tilia platyphyllos (126 cm), Ulmus pumila (110 cm). Street trees with the largest DBH in Mihajlo Pupin Boulevard are Ulmus pumila (110 cm), Betula alba (97 cm), Platanus x acerifolia (89 cm) and Ailanthus altissima (89 cm).

Most of the street trees in Mihajlo Pupin Boulevard (38,58 %) are in the 31-46 cm DBH class, while in the Zoran Djindjic Boulevard this class is represented with 20,68 %. The most represented street tree (Platanus x acerifolia and Populus x euroamericana) have a high potential for isoprene emission, while genus Acer, Prunus and Tilia have low BVOC emission potential. The analysis indicates that air quality improvement could be still managed with future greening projects focusing on species selection and management based on estimation of trees potential for air quality improvement, especially in dense traffic zones of the city of Belgrade.

Session 2

Urban Forest Techniques

LOCATION: CONGRESS HALL

MODERATOR: PROF DR BIANCA BAERLOCHER

DURATION: 11.00 – 12.45

Remote sensing tools for assessments of relation between quality of urban green areas and residents' health: Case study from Belgrade

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Keywords: *remote sensing, quality of urban green areas, human health, Serbia*

The links between green areas and health are summarized in many publications, but there is little evidence to show if the impacts of green spaces on health depend on the quality of the green areas. Therefore, this study aims to examine the relationship of the quality of urban greenery to the extent of the positive effect on the overall wellbeing of urban residents.

The research was conducted in Belgrade, in municipalities Zvezdara, Voždovac, Stari Grad, and Savski venac. Visitors were interviewed at three green areas per municipality, 12 locations in total. Throughout three years, broadband vegetation indexes from Sentinel 2 satellite images were tested to determine the differences in the quality of vegetation in parks. We compared the same category of urban green areas, the data were acquired at the same time, therefore, values reflected well the differences in vegetative indexes. Furthermore, we surveyed the relationship between the socioeconomic and health characteristics of Belgrade´s inhabitants with the quality of the green areas.

Results show that vegetative activity differed significantly among the greenery in different municipalities and was in accordance with the self-estimated health parameters of its visitors. Users of green areas visit the doctor 2-3 times a year and stay in parks up to 3 times a week. The amount of money spent on the medications is inversely proportional to the vegetative indexes' values starting with the average of 6e per month for medications in municipality Vozdovac where the greenery is of the highest normalized difference vegetation index values (NDVI 0.7) and with the lowest quality of urban greenery in Municipality Stari grad (NDVI 0.55) where residents spend on average 10e. Combined with the number of doctor's visits, we see the same inverse proportion.

Exploring enhanced vegetation index values (EVI), we came across similar differences, although EVI's values differ significantly only between the two municipalities – the one with the most vegetative activity (Vozdovac) and the one of the least vegetative activity (Stari grad). Hence, EVI proved to be less sensitive than NDVI.

Our study showed that green areas in city have a great influence on all segments of residents' health and wellbeing. The importance of green infrastructure quality proved to be very relevant. When comparing the same-size urban green areas, we conclude that it is not just the size that matters, but the quality of the greenery is of utter importance.

Estimating ecosystem services for different urban canopy cover scenarios: an application to the city of Padova (Italy)

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Keywords: *Urban tree canopy, Ecosystem services, Urban forest planning*

Environmental services of the urban forest are linked to the extent of the urban tree canopy cover (UTC). UTC is relatively easy to quantify, and it often considered when setting goals for the planning and implementation of future planting and management to improve quality and sustainability of the urban environment. In this study, conducted for the city of Padova, Italy, different existing and possible future scenarios in terms of UTC have been compared. For each of them the ecosystem services they would provide to the city were estimated.

Future UTC goals were set after potential maximum canopy cover was identified, through remote sensing techniques, within the limitations of current land use. Ecosystem services have been estimated using iTree ECO. The model was first applied to the existing municipal tree population, obtaining data from the city inventory. To estimate the services provided by the whole tree population of the city, and the different future scenarios with increasing canopy cover, different sampling techniques were used to identify size, composition and structure of tree populations to be used in the iTreeECO model.

In Consideration of the Tree: The importance of structure and function in the realization of nature-based planning and Ecological Design

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Keywords: *Building WITH Trees, Ecological Design, ecosystem services, forest ecosystem, urban planning, spatial development, urban forest ecosystem*

Trees are a well-known part of the nature-based solution toolbox. When we consider what makes a tree a tree, we usually think of biology and anatomy but is that knowledge enough to actually realize the nature-based solution - long-term tree growth within the context of the built environment?

The focus of an ecological design approach to spatial development is to “minimize environmentally destructive impacts” (Van der Ryn, S., Cowan S. 1996) in planning and designing the built environment. To support this intent, to inform good governance policies and procedures and to better sustain the integrity of the urban forest ecosystem, we must give much greater consideration to the structure and function of an indispensable part of that ecosystem – our trees - and the impact our built infrastructure imposes on them and their ability to provide the Ecosystem Services benefits we increasingly depend on. How then can we create and use infrastructure constructs that consider the tree – that remarkable organism that is a Universe unto itself and an essential for human wellbeing.

Almost all trees planted in our urban centres originate in a forest somewhere in the world. It is therefore essential that we incorporate an understanding of Forest Ecosystem - how that forest tree manages itself - as a basis for spatial development within the Urban Forest ecosystem. We need to invest this understanding into all aspects of Urban Forest management, from planning and design to protecting, preserving and retaining so that the end result is a sustainable, environmentally compatible product which can accommodate the needs of our urban trees, the landscapes they populate and citizen well-being.

This presentation will offer an Urban Forester / Consulting Arborist’s field observations on the tree – its structure and function and how that knowledge can inform ecologically-based spatial planning from an interdisciplinary ‘Building WITH Trees’ perspective.

Tree-related microhabitats in urban areas: preliminary results from urban parks in Padova (Italy)

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Keywords: *biodiversity, tree maintenance, planning, management, tree injuries*

Almost all tree-related microhabitats include tree-borne structures and substrates that play a significant role in the life of plants, fungi and wildlife. For example, the cavities that, over the years, form in the trunk due to wounds and reach a certain size are a possible sheltering place for various animal species. The importance of these elements for the conservation of biodiversity in forests is increasingly recognised and, recently, research has focused on understanding their presence in quantitative terms and their relationship with management activities. However, in urban settings, despite the acknowledged role of urban forests for biodiversity conservation, the presence of tree-related microhabitats has received far less attention. In this contribution, we aimed to retrace the state of the art regarding tree-related microhabitats in the urban areas and present a preliminary analysis of these elements in the city of Padova (Italy). We surveyed 943 trees within 17 urban parks. We analysed the tree-related microhabitats abundance and the number of types observed, thus providing a first knowledge base of such structures and tree substrates in the urban context of Padova.

Outbreaks of non-native Insects in Urban Forests in Serbia

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Keywords: *climate change, non-native insects, outbreaks, urban forest, public green*

Diversity of ornamental woody plants in urban areas includes non-native species originating mainly from North America and Asia. They are hosts of non–native insects which follow their host plants. Climate change with an increase of temperature, frequent droughts and periods with extreme level of precipitation, influence insect populations. Insects from Mediterranean region expand their range and outbreak in continental area.

The research has been conducted in public green, private gardens, protected and managed urban forests in the following cities Aranđelovac, Belgrade, Beočin, Kragujevac, Pančevo, Požarevac, Vršac, Sremska Kamenica and Novi Sad. Standard methods in sampling in entomology were used, pheromone traps and sticky traps.

Emphasise is given to non-native and invasive species, which are harmful to host plants and the most frequently detected. The majority of outbreaking species belong to sap feeders (order Hemiptera) like Aphis (Aphis) gossypii Glover, Corythucha arcuata (Say), C. ciliata (Say), Halyomorpha halys (Stål), Leptoglossus occidentalis Heidemann, Metcalfa pruinosa (Say), Nezara viridula L., Oxycarenus lavaterae (F.). They are followed by bark beetles and wood borers (Phloeosinus spp., Callidiellum rufipenne (Motschulsky)), defoliators (Aproceros leucopoda Takeuchi, Cydalima perspectalis (Walk.), leaf miners (Cameraria ohridella Dimic & Deschka, Phyllonorycter issikii (Kumata) and gall makers (Dasineura gleditchiae (Osten Sacken) and Obolodiplosis robiniae (Haldeman).

Non-native invasive species Harmonia axyridis Pallas is predator of aphids but it also negatively effect native coccinellids. Some other non-native species are molestants and pests in agriculture which are common in parks and gardens. Neodrynus typhlocybae (Ashmed) is introduced from North America to control M. pruinosa in Italy. Due to changed climate conditions it is well adapted in Serbia and it is associated with native hiperparasitoids which are known as natural enemies of native insect pests. This is confirmation that non-native insects share natural enemies with native insects and have an ecological effect in urban forests.

Non-native and invasive insects are serious pests which have a negative economical, ecological and social effect in the urban environment. Integrated pest management, monitoring of main pathways and raising public awareness are important for tree health in urban forests.

Session 3

Case Studies

LOCATION: FIRST FLOOR MEETING ROOM

MODERATOR: NERYS JONES

DURATION: 11.00 – 12.45

Save our existing living urban trees!

Udov Maks[a] and Udovč Tin[a]

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***Keywords**: Herbafertil, Arboriculture, Urban forestry, Horticulture, Landscaping, Climatechange, Vegetationmanagement, Sustainability, Save soil, Urbanlandscape*

Urban trees need help!

In our urban park-forest Maksimir (Zagreb, Croatia), like in all cities in Europe, ancient, veteran and middle-aged trees are slowly dying. This process is characteristic for many urban trees in cities and is progressing every year. We can see this progressing as more and more dead branches appear in the crowns, leaves impacted with pests which prematurely fall, and the vitality of the trees decreases. This conclusion is supported by the fact that the number of new arborist companies increase every year in our cities, and everyone has enough work to cut dead trees and branches through the year.

One of the causes is that compaction of the soil in the cities – this increases year by year. Middle aged and old trees cannot easily expand their roots, because of compaction of the soil, acid rain, lack of humus, extremely reduced number of earthworms, moles, and degraded soil food web. Compaction of the soil disables normal absorption of the rainwater in the root system of the urban trees. So, rainwater flows away before it can be absorbed in the root soil, so trees in cities are starving from thirst. This causes slowing root growth and reduced vitality.

We must not let existing trees to slowly die. So, our company started to rebuild and regrow their roots with our patented product 'Herbafertil', providing them easier access to rainwater and all needed natural components and amino acids to avoid stress, roots aeration and exchange of gasses to bring them again vitality and pest resistance. We must understand that the community should invest in our middle aged and old trees health. Planting only young trees and avoiding the care of existing trees can not save us from climate changes. What would our parks look like without large shadows of the old trees from spring to autumn?

Can we save the tree from drying up caused because of damaged roots by construction works? Is it possible with low-cost investment in tree maintenance? Yes! Our company invented a new way to bring back vitality to damaged trees by construction works. You do not need heavy and expensive machinery for aerating the soil around the treated tree. We are doing an excellent job with patented root regrowing jute bag Herbafertil. It can be implemented with light manual motor drill. After implementation circa 6-12 months, every Herbafetil initiates growth of 6-7 kg of new root ball. Those new roots return vitality to the tree and regrow damaged roots in a short time.

An urban land reclamation project resulting in social and economic benefits: Lake of Olarias in Ponta Grossa, Brazil

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Keywords: *land reclamation, urban park, social and economic benefits*

This presentation focuses on an urban park named Lake of Olarias, a public park with a medium sized, man-made lake, located in the city of Ponta Grossa, in the Brazilian state of Parana.

Ponta Grossa includes a population of over 335,000 inhabitants, with few existing parks within the confines of the city. Planning for Lake of Olarias began over 20 years ago, often impacted by local elections and mayoral administrations—some supported the development of the park and some did not. This resulted in long periods of planning dormancy over the two-decade planning period.

The lake is an important flood containment project, as its basin is filled by several small streams that have caused seasonal flooding for many decades. Regarding its role in the community, the lake is an important connecting link for many localized neighbourhoods, providing residents with much-needed leisure opportunities. The shores of the lake have been optimized for the leisure benefits of Ponta Grossa residents.

Thousands of trees have been planted. A holistic landscaping project was carried out to allow for a pleasant, rolling hill environment. Included in the park is parking for 300 vehicles, bike paths, skateboarding area, walking trails, outdoor gym, a panoramic deck and an outdoor amphitheatre. There are interpretive panels about the birds that can be seen, and the local heritage is highlighted. From the park it is possible to observe a large chimney of an old pottery, where brick and pottery factories were plentiful.

Plans for four additional lakes in the same watershed exist, with the eventual footprint totalling over 120,000 square meters. The creation of the park complex has brought numerous social benefits to the territory, as well as a localised economic impact. Breweries, restaurants, and real estate developments emerged, resulting in a substantial increase in real estate values in several nearby communities. In conclusion, the Lake of Olarias, and surrounding public park, located in a previously abandoned industrial area now provides Ponta Grossa residents with a safe and secure leisure setting. The Lake and park have become a tourist attraction within the state of Parana and is a good example of a land reclamation project that has resulted in both positive economic outcomes and quality of life benefits.

Planning urban forests. Regulations and autonomies

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Keywords: *Metropolitan cities, Planning process, Forest urbanism policy-making*

Western civilisation has distinguished the limits of crops from the shady edge of forests, delimiting cities, drawing the boundaries of institutional domains and jurisdictions. Today, the forest is once again becoming an ally of mankind and institutions to react to even greater dangers: it becomes a space where one can find refuge from the terrible effects of pandemics or other health crises, it becomes a tool to fight climate change, it represents a new spatial dimension of living, it becomes a resource on which to operate to conquer new security. These are changes that - it is clear – require the definition of new spatial planning policies.

Even more dense in its design, ecological and aesthetic potential, the forest appears when compared with the mineral and grey space of the city. Therefore, urban forestation is among the most recurrent measures in international sustainability programmes and strategic documents. Among these, the EU Biodiversity Strategy 2030, which highlights the importance of new "forests in the city" and the new European Forestry Strategy, which places forestry growth in urban areas among its priority objectives.

In Italy, the regulatory data is still scarce, and it seems to be quite hard to give autonomy to the topic and its urban policies, often including it generically among the development policies of "urban green spaces". In 2019 Italy has adopted the "Climate Decree" with a specific provision dedicated to "actions for reforestation" among whose measures there is the "creation of urban and peri-urban forests". The 14 Italian metropolitan cities are chosen as experimental place of application. In fact, they represent the most populous and complex urban realities which are more exposed to pollution phenomena.

Today, the considerable spending program of the National Recovery and Resilience Plan (NRRP), the greater resources reserved for the Mission 2 'Green Revolution and Ecological Transition' which directly derives from the European Green Deal, will try to respond through 'Forestation Plans'.

Starting from these reflections, the author wants to reflect on the capacity that these new regulatory tools of spatial planning have in the Italian context, to respond to the criteria of flexible territories and dynamic boundaries that today's planning requires.

Planning and managing public urban green spaces for urban wild food foraging

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Keywords: *Urban biodiversity conservation, Provisioning ecosystem services, Edible city, Wild-plant gathering, Near-natural green space management*

Urban wild food foraging connects urban residents with natural environments in urban areas and contributes to the transmission of knowledge about food production and healthy foods among urban residents, regardless of their income, education attainment or origin. In addition, urban wild food foraging is a widespread activity, with one-third of urban residents in Berlin, and almost two-thirds of visitors to urban green spaces in Vienna reporting to forage. Yet, urban wild food foraging is rarely appreciated by public bodies on public urban green spaces.

To more firmly establish wild food foraging in public urban green space management, this study examined the criteria influencing foragers' selection of wild food foraging locations on public urban green spaces. To do so, we conducted 21 semi-structured expert interviews with urban foragers, environmental educators, managers of public urban green spaces and open space planners in Vienna, Austria, and analysed the data using qualitative content analysis.

Our results suggest that 11 specific criteria relating to spatial factors, green space management, and visitors to public urban green spaces influence foragers' selection of foraging locations. Four overarching selection criteria stand out: i) near-natural and wilderness-friendly management of public urban green spaces, ii) good access of foraging locations, iii) low contamination of foraging locations, and iv) low frequency of visitors.

However, interviewees reported that urban foragers do not uniformly follow these overarching criteria, but evaluate foraging locations subjectively, also depending on the plant materials and mushroom species targeted. Therefore, although near-natural public urban green spaces are generally preferred, for some foragers even intensively managed and unmanaged public urban green spaces may offer some advantages.

We suggest that wild food foraging in urban areas is best supported by near-natural green space management that ensures availability and access to foraging locations. Moreover, comprehensive information about contamination of public urban green spaces and clear codes of conduct for wild food foraging are needed. Implementing these proposals would not only benefit wild food foraging in urban areas, but also ensure multifunctional benefits from public urban green spaces for urban biodiversity, urban green space management and urban residents.

Two decades of urban forestry around Budapest

Péter Csépányi[a], Gergely Lomniczi[b] and István Rittling[c]

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***Keywords**:* explosive frequency because of COVID, continuous cover, cooperation, urban forest development program

According to official statistics the total forested area in Hungary is 2,057,004 hectares (22%), of which 56% belongs to the state, 1% to local communities, and 45% to private owners. The Pilis Park Forestry Company (PPF) is a state-owned company that manages 64,101 hectares of state forests in and around Budapest, which are the most visited forests in Hungary. PPF has been involved in urban forestry from the beginning, as part of the EFUF held in Budapest in 2000. These forests represent an invaluable resource for Hungary's capital city Budapest as well as the surrounding urban areas as they provide recreational possibilities and facilities to millions of visitors. In addition to tourism, the climate protection services of forests have also become more valuable in the past period. One third of Hungary's population lives in the capital and in its agglomeration. Urban people are much more demanding of ecotourism services in forests than those living in rural areas. This is well illustrated by the 'explosive' increase of visits during the COVID-19 pandemic which, based on our experience, is one and a half times the previous forest visit indicators, resulting in 35 million occasions per year.

Although the forests have traditionally been managed in rotation forestry system (RF) in Hungary from 2000 the appreciation of forest recreational services has prompted PPF to introduce silvicultural systems that better meet the requirements of urban forestry and maintain continuous forest cover. Due to the consistent process, the share of silvicultural systems suitable for urban forestry has increased and the share of traditional RF is currently only 51,7 %. Several developments have taken place over the last 2 decades: we have now 11 lookouts, renovated 10 forest accommodations, marked out 350 kilometres bike- and 60 kilometres riding path. We are increasingly pursuing a treatment that is different from traditional forestry practices, adapted to urban conditions and, of course, constantly evolving, and has now grown into an Urban Forest Development Programme. In this programme, we consider forests as the basis of the infrastructure of tourism: the first step in tourism development is to maintain forests. We are currently preparing a professional plan that will establish extensive cooperation with municipalities and other organizations based on the experience of the sample areas created on the lowland and hilly side of Budapest.

Session 4

Communicating the Urban Forest

LOCATION: CONGRESS HALL

MODERATOR: PROF DR ALAN SIMSON

DURATION: 08.30 – 11.00

Trees management: Switzerland wants to create synergies between urban areas and forests

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Keywords: *Urban trees and urban forests management, Synergies, Awareness, Knowledge transfer, Interactive graphic, Podcasts*

Awareness of the importance of urban forestry issues is growing, as evidenced by the numerous international activities of various actors such as the FAO, UNDRR and UNECE on that thematic. This trend is also evident in Switzerland, where the new CAS in urban forestry launched by the University of Applied Sciences of the Grisons has been very successful. Training is clearly a necessary pillar for the implementation of concrete and effective actions in urban forestry.

So is awareness of the need for knowledge exchange and collaboration between the various disciplines and specialists in urban forestry. Supporting the latter idea, Switzerland has decided to launch awareness-raising activities to highlight the synergies between different urban forestry practices. The basic idea is to present the two types of tree management (in cities and in urban forests), to draw potential synergies that could be beneficial to the different managers.

These communicative actions are mainly, but not exclusively, aimed at urban forestry practitioners. In concrete terms, they consist first of developing an interactive graphic on the management of trees in the city and the management of urban forests in order to deduce the objectives of the two types of management. Secondly, the creation of podcasts presenting discussions between urban trees and forests managers provides an understanding of the challenges each faces in their tree management and aims to better understand and highlight potential synergies. The distribution of the products (newsletters, social networks, etc) is ensured by the participation in the project of the national association ArboCityNet and by the support of the Federal Office for the Environment.

After a brief introduction, the author will present the products of this knowledge transfer project between the different disciplines of urban forestry.

How to organize, market and get acceptance for a large-scale tree planting campaign in a public housing area?

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Keywords: *Urban forestry, Urban tree inventory, Municipal housing company, Tree planting campaign*

In 2021 and 2022 the municipal housing company (MKB) in Malmö, Sweden, is planting over 500 trees, one per employee. The trees are being planted to capture carbon and reduce the negative impacts of climate change. To make sure the right trees are planted in the right places, all trees in all the companies housing areas are being inventoried, which include over 15 000 trees, and all new tree plantings are based on specific criteria e.g., that they should increase tree diversity but not be of a species that are common in the surrounding areas (e.g., streets, parks, cemeteries and private gardens). The trees also need to become large individuals (thereby increasing the amount of ecosystem services they provide), and they also need to improve the wellbeing of the people living in the public housing apartments.

As part of the tree planting campaign, it is crucial that the campaign gains acceptance from the residents and large efforts has therefore been made to inform the residents and get media attention to this large campaign. The project has also included the creation of a whole new tree planting description, including procurement and video instructions to the entrepreneurs, so that the survival of the trees is (almost) guaranteed.

The presentation will tell the story of the planning, execution and challenges surrounding the tree planting campaign.

The role of foresters in urban forests

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Keywords: *modern urban forester, understanding of forester's role, interdisciplinary work, professional skills*

The classic image of foresters consists of a male person in green clothing who is responsible for timber management and hunting. Sovereign tasks such as dealing with poachers and wood thieves complete this picture. Forester lodges were in the remote forest and the forester had to be able to deal with often very lonely situations. His dog was the familiar companion in all situations of life. Forest management geared mainly to the sustainable use of wood.

The forest has moved strongly into the focus of the public and is gaining more media and social attention in times of climate change and fulminant loss of biodiversity. Classical forestry principles are in discussion by society and new forms of forest management and perception are increasingly in focus. This change has been evident in urban forest management for some time. It also raises the question 'what role do foresters play' in urban forests today?

Urban foresters are naturalists with a keen eye for the peculiarities of a site. They act as mediators and companions for the intentional approval of biological processes, as trained personnel with forward-looking skills for the longer term. They are recognisable in the area and keep an eye on all forest ecosystem services often with an emphasis on social and climate aspects. Urban foresters vigilantly ensure the safety of paths, nature conservation areas, design recreation and sports opportunities, work in a networked manner in all green-planning urban working groups and offer participatory forms for forest management. Therefore, they are open minded and sensitive in the use of language when communicating with citizens. Urban foresters are open to scientific knowledge and developments, self-reflected, with interdisciplinary interests, careful and sustainable protectors and stakeholders of the multifunctional forest. They convey this effectively as environmental educators, where they skilfully use suitable dogs, among other things. They can turn to civil society and to act smoothly and reliably in their team.

There is an affinity for qualitatively demanding public relations work for the urban forest at all levels. In addition to newspapers, radio and television, contributions on social media are gaining in importance. Photo competitions, exhibitions and participation in panel discussions as well as workshops on urban forest topics are practiced techniques for information and communication.

Communicating the Urban Forest: An Inside Narrative

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Keywords: *communication, forest visitor, short forest story*

Urban forests as one of the most visited forests may be at the forefront of the "new forestry school". This, together with traditional knowledge, includes new stakeholder demands and expectations, such as participatory planning and inclusive forest management.

Communication seems to be its indispensable tool. How to present forests in today's information overloaded age? "Outside the forest" communication deals with informing and promoting the roles and values of (urban) forests for various target groups, from the general public to special groups such as decision-makers or private forest owners.

This presentation deals with another type of communication - communication "within the forest". How to properly address a person who came to the forest for recreation and relaxation? Does it need to be addressed at all? If yes, how to approach this? How to make it interesting, professional, attractive and competitive enough? And not too simplistic.

The presentation is based on a communication project that took place in the Urban Forest of Celje, Slovenia, in the period from 2014 to 2021. Two main approaches were developed: (1) DIRECT CONTACT with the visitor (guided tours, forest pedagogy, visitor centre, forest cultural events) and (2) INDIVIDUAL ADDRESSING of the visitor (entry points, communication posts, nature interpretation, notices, warnings, restrictions).

The concept of a communication post is probably the best illustration of this approach. It combines a variety of information, from signposts to restrictions, all with a consistent graphic design. The main content of the communication post is a short forest story - a structured, reader-friendly professional text with a certain amount of humour and provocation, usually a maximum of 85 words. Depending on the location, the stories talk about a variety of topics, from forest-specific characteristics of an area to global issues. So far, 47 communication posts have been carefully set up in the Urban Forest of Celje. They are usually located at the crossroads of forest paths and at the appropriate distance from each other, to avoid overloading the forest with equipment and information. A recent survey of visitor responses found that 78% of visitors read the content of the stories and 75% understood their message.

Co-creation of new knowledge through exploring perception and use of cultural ecosystem services of urban green infrastructure in the city of Zagreb, Croatia

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Keywords: *cultural ecosystem services, urban green infrastructure, participatory mapping, Zagreb*

Urban green infrastructure produces and provides a number of ecosystem services with cultural ecosystem services being highly important for people living in the cities. Since cultural ecosystem services are subjective, therefore challenging to quantify using proxies, creating knowledge about perception and use of cultural ecosystem services must include its users. PPGIS (public participation GIS) is a valuable tool which allows collecting rich array of data about the spatial distribution of diverse attributes related to cultural ecosystem services alongside additional data from non-experts to create a comprehensive overview of the topic.

In the City of Zagreb, Croatia, perception of certain cultural ecosystem services was explored using focus group participatory mapping, namely place attachment, recreation, aesthetics, education, and cultural identity. Focus group participatory mapping gathered quantitative and qualitative data on the topic of perception and use of cultural ecosystem services in every City district in Zagreb. Spatial data was collected with placing markers of mentioned locations on a physical map of the city district. Based on 21 conducted focus groups throughout the City of Zagreb with 94 participants in-depth data about perception and use of different parts of urban green infrastructure was collected. With digitising, categorising, and analysing collected spatial data results show that respondents perceived 13 types of urban green infrastructure as provides of cultural ecosystem services in the city. Parks and forests were the most often mentioned types of urban green infrastructure, and bearers of all cultural ecosystem services in question. However, other types were also important such as tree lines and single trees. Besides, patterns in perception and use were distinguished indicating different perception and use among types thus need for addressing those differences in planning, management, and operational work.

Newly created knowledge about perception and use of cultural ecosystem services in cooperation with users of those services can help informing and enhancing planning and management of tree-based urban green infrastructure in cities. Even though conducting focus groups with participatory mapping is lengthy process, collected data could be beneficial and added to the existing knowledge base to enhance urban green infrastructure in a way that keeps providing ecosystem services and being beneficial to citizens' well-being.

Tree Cities of the World: a framework for progress, policy and professionalism

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Keywords: *Partnership, Standards, Policy, Opportunity, Engagement, Community, Coastal, Challenges*

As lead partner promoting the Tree Cities of the World (TCOW) scheme in the UK, Trees for Cities (TfC) presents the programme as a framework for progress, policy and professionalism in urban forestry.

UK towns and cities face significant opportunities and challenges in the emergence from lockdown; with urban populations valuing greenspaces more than ever, amid increasing pressure and targets to address the climate crisis through tree planting.

With green spaces and trees firmly on the public and political agendas worldwide, alongside a recognised need to "Promote the use of international standards and guidelines" (Dr Cecil Konijnendijk, Policy Brief for the UNECE), the presentation will look at how TCoW can help address this through its five standards for recognition.

Presented by TfC in partnership with the Arbor Day Foundation, the presentation will include examples of recognised towns and cities in the UK and mainland Europe, to demonstrate how the TCoW programme can act as a launch pad in helping to engage communities with their trees and raise standards globally. Lastly, the presentation will showcase a multi-stakeholder programme being deployed by TfC to support and on board disadvantaged coastal communities (statistically shown to have lower canopy cover) with their tree planting to prepare them for TCoW applications next year.

Do you have to turn the forest into money?

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Keywords: *values, conflicts, forests*

The management of urban forests and trees by forestry authorities and related state institutions is increasingly critically observed by citizens. Especially tree felling operations and the use of heavy machines such as harvester and forwarder are criticised by the urban population. In many places citizens' initiatives are formed to initially stop tree felling operations. Meanwhile in Germany there exists an ever-growing network of forest-related citizen initiatives. These groups do not only criticise tree felling operations but question silvicultural concepts and goals. A key point of criticism is the production of wood for economic purposes. In contrast, the citizens initiatives emphasize the importance of forests for the protection of the climate and other public goods.

The groups try to exert political influence on forest management through petitions and by involving the media. Several case studies show how the urban forest becomes a place where societal values of nature and natural resources are negotiated, and business interests are set against the demand for public services. At the same time urban forests even become places where institutional authority is questioned in favour of participatory processes.

Session 5

Climate and Sustainability

LOCATION: MEETING ROOM FIRST FLOOR

MODERATOR: DR RIK DE VREESE

DURATION: 08.30 – 11.00

Influence of urban environment and climate change on tree growth of common urban tree species in Munich, Germany

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***Keywords**: Urban Trees, Urban Climate, Ecosystem Services, Climate Change, Tree Growth*

Many studies show how cities benefit from the ecosystem services provided by urban trees. The amount of ecosystem services strongly depends on tree age and therefore their growth. In this study, dendrochronological analyses are conducted to investigate growth and drought tolerance of the four common urban species T. cordata, A. platanoides, R. pseudoacacia and P. x acerifolia in the temperate city of Munich, Germany. In this way, the impact of climate change on tree growth can be studied, as well the effects of urbanity degrees (suburban vs. urban) and different planting categories (street/squares vs. parks). Increment cores from 137 trees spread over a transect starting from the city centre and finishing in the suburban area have been collected. Basal area development over age was calculated and statistical testing of different effects was performed with linear mixed models. Moreover, a drought-tolerance analysis (SEA) was conducted.

Independently from species, urbanity degree and planting category, the results reveal for an 80-year-old tree reduced growth of 33 %, compared to growth before 2000 for a tree of the same age. Tree growth in urban zone, characterized by higher urbanity degree, is 40% lower than in suburban zone. Suburban- and park trees showed remarkable decreased growth in drought years which could be explained by their lower adaptation to water-shortages compared to the street/square- or urban trees which are more adapted to aridity. The highest basal area development was observed for P. x acerifolia, a species with a high drought tolerance comparable to that of R. pseudoacacia. Along streets and at squares, R. pseudoacacia had surprisingly high growth values, being comparable to P. x acerifolia. A. platanoides showed lower basal area increments than R. pseudoacacia but accelerated growth compared to T. cordata and the fastest recovery after droughts. These dendrochronological findings could serve as information for city planners concerning species selection.

Urban forest, a crucial element in climate change adaptation in cities – Belgrade case study

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Keywords: *co-creation, citizen science, climate change, TeRRIFICA*

Climate change is one in a series of worrisome issues we are currently facing, while their manifestations and influence are experienced fiercely and increasingly across the globe. The effects of climate change are unequivocally harsh in the Western Balkans where the increase in the average annual temperature is slightly higher than the global average. Belgrade, as one of the major urban structures in the area, has already been threatened by climate change, which affects its basic infrastructural systems, housing, and in general life quality and human health.

The TeRRIFICA project has developed an innovative approach to science communication open to individuals and groups to take an active part and influence climate change institutional, governmental and policy adaptations in cities to reduce the harmful effects of climate change. In a system defined by the RRI policy, the SDG and the climate adaptation and mitigation measures, TeRRIFICA operates in six European regions. A practical outcome of this co-creation process is the crowd-map that visually demonstrates the geographical spread of climate change effects that people encounter every day. The map enables users to link their observations to growing environmental issues while raising awareness of global climate change trends. This tool helps users identify local needs and priorities in terms of water supply, air quality, land maintenance, surface temperature and wind flow, ponder on locations where these issues escalate and pinpoint these conflict zones on an online GIS map.

Such an up-to-date crowd mapping tool enables local communities to reflect upon and learn about climate change and its contextual repercussions upon urban forestry in their immediate environment. Considering these crowd mapping results; thorough data analysis provides an overview of the character and distribution of positive and negative effects recognized by the wide range of local actors who fed a local TeRRIFICA map for Belgrade. The project outlines aspirations and opportunities to incorporate such data into local decision-making processes at all scales, from bottom-up to top-down. The goal is to broaden the discussion to include diverse external challenges and local experiences to inspire and encourage outside parties to join the debate, advocate for innovative climate actions to tackle the growing climate change crisis and influence the constitution of decision-making processes in the cities of tomorrow.

Climate Species Lists – A combination of Methods for Urban Areas

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Keywords: *Climate change, Climate tree, Urban tree, Climate region*

Climate change poses a major threat to urban tree populations, and its negative effects can already be observed today (Andreas Roloff et al., 2009; Uehre & Herrmann, 2017). Higher temperatures, seasonal changes in precipitation, and extreme weather events are increasingly affecting trees. To counteract the increasing challenges of urban trees, strategies are increasingly being sought to preserve existing tree populations on the one hand and to prepare for the coming years on the other. One such strategy, lies in strategic climate tree species selection. The search is on for species or varieties that can cope with the new climatic conditions. Many efforts in German-speaking countries deal with this in detail, such as the tree lists of the German Conference of Garden Authorities (GALK), the project Stadtgrün 2021 or the instruments of the Climate Species Matrix by Prof. Dr. Roloff. In this context, different methods for a correct species selection are offered. One possibility is to select for certain physiological attributes that indicate the climate resilience of a species (McPherson et al., 2018; Stratópoulos et al., 2019).

To calculate the dissimilarity of the present climate of different geographic regions in relation to the future climate of any city, a weighted (standardized) Euclidean distance (SED) for seasonal climate values is calculated for each region of the Earth according to the methodology of Williams et al. (2007). The calculation was performed in the QGIS geographic information system, using global raster datasets on monthly climate values in the 1981-2010 standard period. Data from a European forest inventory were used to identify tree species growing in the calculated analogue climate regions. The inventory used is the compilation of georeferenced point data at a 1 km grid resolution on the occurrence of tree species in 21 European countries (Mauri et al., 2017).

In this project, the results of the methodological application are shown for the city of Zurich for the year 2060. In a first step, analogue climate regions based on projected climate values for the measuring station Kirche Fluntern (ZH) were searched for. In a further step, the methods mentioned above were applied to generate tree species lists for the city of Zurich. These lists were then qualitatively evaluated with respect to the suitability of the different tree species for the Zurich area to generate a cleaned and thus usable list of possible future tree species.

Remote sensing as a tool supporting urban greenery management from the continental to the city scale

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***Keywords**: remote sensing, airborne and satellite data, scalability of solutions, quality of greenery in cities*

Information derived from analysis of airborne and satellite data are increasingly supporting decision-making processes in green area management at the scale of cities, the country, or the entire continent.

The geoinformation products developed in recent years provide practical knowledge of current remote sensing capabilities. However, conscious and effective use of these products requires knowledge building and the trust of greenery managers in remote sensing methods of data acquisition and processing. The aim of our study was to prepare an overview of remote sensing solutions implemented in the market, which can in various ways support the greenery management process at the scale of individual cities, regions, countries, or the entire continent.

A solution that has been implemented across Europe is the annual trend of vegetation cover in Urban Green Infrastructure (UGI), which provides information on changes in vegetation condition based on the NDVI index. This indicator was prepared for 700 cities according to a published methodology using satellite imagery. However, vegetation trend index is characterized by relatively low spatial resolution (pixel size = 900 m²) which makes it impossible to draw conclusions on the level of land parcels or individual objects like trees. On the other hand, due to the availability of satellite archive scenes, it is possible to analyse changes in the condition of BGI in time, reaching even the data from the 1980s.

An example of a solution implemented at the scale of the whole country (Poland) and based on aerial data is the National Tree Crown Map. Developed because of free LiDAR data, it provides basic and approximate information on the distribution and height of trees for all cities in Poland. With this product, it is possible to compare cities on a regional scale and identify areas of low tree density that require adaptive solutions. The resolution of the data makes it possible to perform analyses also at the level of individual land parcels or settlements.

An example of a solution based on remote sensing data implemented on a city scale is the detailed tree map developed for Warsaw in 2018-2020. This map was generated based on LiDAR and hyperspectral data acquired for this project, covering an area of more than 500 km2. As a result of this work, the greenery managers have obtained detailed information on the trees crown range, taxonomy and condition for more than 7 million trees.

Trees as Infrastructure (TreesAI) A platform to value and invest in Nature: Carbon and beyond

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Keywords: *Ecosystem services, Nature-based Solutions, Green Infrastructure, Natural hedging*

Cities around the world are acknowledging the importance of trees and pledging ambitious afforestation targets. However, we are struggling to maintain our existing tree stocks.

This paper presents the case of TreesAI; a cloud-based platform, establishing nature as a critical part of urban infrastructure, alongside bridges, roads and rail, enabling investment, profitability and sustainability. The aim of TreesAI is to establish urban trees as investable assets, with multi-dimensional values.

TreesAI aims to support city scale decision-making for green infrastructure by bridging science, technology, and civic participation. State-of-the-art machine learning methods are employed to detect trees from 2D or 3D image data, recognize species and observe growth. A novel Scenario Analysis Framework (SAF) is developed to design and forecast green infrastructure portfolios and their impacts (50+ years), under varying weather trajectories, maintenance regimes, species compositions, spatial distribution, exposure to disease, etc. The framework is based on an agent-based modelling and simulation paradigm, enabling to embed a green infrastructure portfolio within economic and social configurations of a city.

In this case-study, we analyse urban forests in Glasgow. We detect tree population and topology, and we analyse how the urban forest and its capacity evolve over time. Various scenarios are built upon different weather conditions and several maintenance practices, focusing on avoided CO2 emissions, carbon sequestration, water retention capacity, avoided runoff, and flood reduction. It is found that maintenance practices reduce trees' dieback, improving forest capacity and growth, which consequently boosts carbon sequestration capacity and avoided CO2 emissions. Additionally, canopy growth raises the capacity for water retention, avoided runoff and flood prevention. The performance of trees to intercept and store the water is better for low and medium rain intensity, while the total runoff depends on the tree typology and the type of soil below trees, suggesting the importance of trees especially in grey and impervious cover areas.

We suggest that developing the above capacities through an open-source platform, establishing the replicability of such case studies across cities, allows the construction of an economic case where the multi-stakeholder values of urban forests far exceed its costs, making a compelling argument for maintaining a green infrastructure.

Influence of urban green spaces in reducing thermal heat load across spatial and temporal gradient

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Keywords: *Urban Heat Island, Green spaces, Energy balance, Boundary layer air-cooling, Human thermal comfort*

Urban green infrastructure is widely known for promoting adaptive capacities of cities to climate change by alleviating urban heat island (UHI) and thus heat stress for humans. However, a detailed understanding on the mechanisms of different components of greenspaces on reducing heat loads at local and city scale is still limited.

We investigated surface energy balance, boundary layer air-cooling through evapotranspiration and the human thermal comfort over the last four years across two major cities in Germany – Munich and Würzburg.

Firstly, we found that the differences between sun and shade were steeper over the grass surfaces and during the wet spells (evapotranspiration rate > 1.5 L m-2 d-1). In contrast, sensible heat fluxes between grass and paved surfaces were not different during the dry spells. Moreover, compared to the building shade, tree shade further reduced air temperature (AT) by 0.6 °C, but physiological equivalent temperature (PET) by 1.6 °C.

On a separate study in Würzburg, we found that at sub-urban sites, relative humidity and wind speed was higher but AT lower compared to the inner-city sites. Mean AT of inner-city sites were higher by 1.3 °C during summer compared to sub-urban sites. The magnitude followed the spatial land use patterns, in particular the number of buildings. Consequently, out of 97 hot days (AT > 30 °C) in three years, nine days above the extreme threshold of wet bulb globe temperature of 35 °C were recorded at a centre site compared to none at a sub-urban site.

Regarding species traits, we compared two ecologically contrasting species - Tilia cordata and Robinia pseudoacacia. T. cordata with 35% higher leaf area index and diffuse porous wood anatomy provided four times more transpiration thus, up to 2.8 °C AT reduction (ΔAT) and up to 2.6 g m − 3 (ΔAH) increase in absolute humidity compared to 1.9 °C of ΔAT and 1.9 g m − 3 of ΔAH within the tree canopies of R. pseudoacacia. Thus, PET was up to 4 °C under the shade of a R. pseudoacacia compared to 11 °C under a T. cordata tree.

Our results underline the importance of both shade and grass surfaces in reducing the urban heat loads, in particular, the added benefits of tree shade during the summer droughts. The results feature the importance of urban topography, such as street orientation, surrounding environment such as geometry, urban design to reduce the hindrance of wind flow and proportion of greenspaces in terms of outdoor human thermal comfort.

LIFE URBANGREEN: efficient urban green management tools for adaptation to climate change

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Keywords*: urban green management, ecosystem services, smart cities, software platform, tree management, Carbon sequestration, air amelioration, tree transpiration*

An increasing number of cities around the world use management tools for green infrastructures. Greenspaces, a management Platform developed by R3GIS in Italy, builds upon a detailed census of public green areas and helps municipalities to efficiently plan and monitor maintenance activities.

Information given on the platform shows when and how a tree was pruned, when the next tree stability assessment will be performed, when a lawn will be mown etc.

The platform allows users to report internal costs for the municipality as well as the costs of external contractors, allowing limited resources to be managed efficiently

How do we make the ecosystem services of urban green areas and their benefits against climate change visible in real-time and even more effective? R3GIS, in conjunction with their technological and scientific partners, ProGEA 4D (Poland), the University of Milan (Italy) and the University of Florence, addressed these topics in the EU-funded project LIFE URBANGREEN within the cities of Rimini (Italy) and Krakow (Poland). The project not only enriched the Greenspaces platform with new innovative modules, but also tested and evaluated their effectiveness on parks and avenues in Rimini and Krakow:

- Optimising water consumption, providing water only when and where needed.
- Reducing the carbon footprint of maintenance activities by organising a more efficient working plan and considering weather forecasts.
- Quantifying ecosystem services provided by green infrastructure.
- Monitoring health parameters in trees by using remote sensing data.
- Increasing citizen participation in urban green management.

R3GIS coordinated the project, developed the new software tools and integrated them into the Greenspaces platform. The algorithms forming the basis of these new tools were developed by the University of Milan with data recorded in field surveys and three-dimensional inventories provided by the technological partner ProGea 4D. The new tools were tested in Rimini and Krakow.

The knowledge gained and the tools developed through the LIFE URBANGREEN project facilitate the understanding of urban forests, how to manage them more effectively and how to maximise their benefits for citizens. The new data provided by the platform supports decisions that help cities better adapt to the effects of climate change.

Session 6

Urban Forestry and Society

LOCATION: CONGRESS HALL

MODERATOR: CHRIS BAINES

DURATION: 08.30 – 11.00

A comparative study between Belgrade and Vienna on resident's attitudes on health effects of urban green spaces

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Keywords: *urban green spaces, resident attitude, human health, comparative study, Belgrade, Vienna*

Numerous reviews of empirical evidence strongly support the positive influence of urban green space on the perceived general health in urban population. This study examines whether and how visits to urban green spaces have an impact on human health perceptions. The study was conducted in eight urban green spaces in two European cities, Belgrade and Vienna. On-site, face-to-face surveys asked urban green space visitors about green space use and health perceptions (N = 453). The survey was stratified by the type of urban green spaces (inner urban, urban and peri-urban-natural).

The results indicate strong evidence of the relationship between urban green space and human health and wellbeing and suggest that visiting urban green spaces can make a positive impact on human health perceptions. Participants perceived all types of urban green spaces as restorative. Belgrade residents had a more positive attitude towards the human health impacts of the green spaces in their city. They considered that physical activity, general health, social cohesion, sensory experience, thought which greenery might exert a more positive effect on human health compared to the residents of Vienna.

Building capacity: Applying co-governance model in urban forest of Ljubljana, Slovenia

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***Keywords**: building capacity, common policy, co-governance*

In the Ljubljana Vision 2025, the City of Ljubljana (COL) has set a strategic goal to be a sustainable city. One of the first important measures was that the City declared 1,153 hectares of "special purpose forest" in order to emphasize the public importance of urban forests. The 85 % of these forests are privately owned. Therefore, the decree on special purpose forest also defined different compensation measures for forest owners, which were just partly applicable.

In three consecutive years (2014 – 2017), many natural disturbances happened, which were the moment of recognition that neither COL nor Slovenia Forest Service (SFS) on their own are capable of resolving accumulated difficulties in urban and peri-urban forests (UPF). This encouraged the more intensive collaboration between COL and SFS and initiated a common policy towards private owners. COL became the leading partner in the Interreg project URBforDAN, which focused on joint development of new approaches in UPF management of seven cities in the Danube region. The basic idea of the project was how to address relevant UPF troubles in collaboration among local public authorities (cities) and forestry expert institutions in all participating countries.

The approach has had a very high level of legitimacy that is essential for resolving such complex issues. Joint co-governance approach of COL and SFS resulted in adoption of City of Ljubljana forest development strategy 2020 – 2045, which was accepted by the City Council. The strategy shed light on the importance of urban forestry in wider local policy and consequently reinforced the capacity for fundraising. The approach also produced operational management plans for the focus areas that are an important basis for the COL in providing public services from UPF on the field. The results already are visible, since a large part of the focus areas were equipped with new urban recreational infrastructure. Above all, the main advantage of this approach was building a huge capacity among the main institutions that will be able to deal with very complex environment of UPF, reply promptly in case of natural disturbances, fight the climate change challenges and others. In addition, it will be a key point between forest owners, forest visitors and other stakeholders for problems resolving, rising awareness and informing them about the situations in UPFs.

Llobregat & CO living co-creation laboratory: AMB contribution to the H2020 CLEARING HOUSE Project

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Keywords: *Metropolitan Area of Barcelona, H2020 CLEARING HOUSE, nature-based solutions NBS, Urban Forest, Co-creation, Co-design workshop, Participatory GIS*

This paper examines the role of the Metropolitan Area of Barcelona (AMB) as a local partner in the H2020 CLEARING HOUSE Project. To do so, it focuses on the main challenges and outcomes of the Llobregat & CO living co-creation laboratory.

CLEARING HOUSE (September 2019- November 2023) is led by the international organization European Forest Institute (EFI) and gathers 26 members from 10 European and Chinese cities and metropolitan areas. It aims at analyzing and developing –across China and Europe– the potential of UF-NBS (Urban Forests as Nature Based Solutions) for enhancing the resilience of cities and metropolitan areas that face major ecological, socio-economic, and human wellbeing challenges.

Urban trees and forests are a nature-based urban solution that contributes to more sustainable urban development. Its potential to provide services to ecosystems, improve biodiversity, and contribute to the well-being of urban societies is often underestimated and underused.

The AMB is contributing to the comparative analysis of the different case studies. It also contributes and benefits from the exchange of experiences with European and Chinese cities through a collaborative learning process. In the case of the metropolitan area of Barcelona, the project looks at the lower basin of the River Llobregat and seeks to involve people, entities and other local agents from the territory to provide a close and participatory governance model.

One of the main strategies has been the design of the Llobregat & CO laboratory. This living lab includes co-creation workshops, ecosystem services card games, online participatory GIS tools and other activities. The main objective is to share and create collective knowledge related to nature-based solutions, especially those based on urban forests and trees. One of the main challenges has been to identify a network of different actors and stakeholders, which could generate positive synergies and further encourage the use of UF-NBS along the river.

Public Participation in the Management of Urban Forests: Ecosystem Based Management Plan Prepared by Local People

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Keywords: *Green infrastructure, Istanbul, Urban Forestry, Üsküdar, Validebağ Grove*

Istanbul, the largest socio-economic city in Turkey, hosts 18.49% (16 million) of the country's total population. Implementations on meeting the needs of housing, transportation, infrastructure etc. of this population have reduced the rate of green space in the city to 2.2%.

Validebağ Grove, whose history dates back to the beginning of the 18th century, is a 35-hectare green area within the borders of Üsküdar district in Istanbul. Surrounded by urban settlements on four sides today, the grove has been protected as a 1st Degree Natural Site since 1999 and meets the recreational needs of the urban community. However, the efforts of the central and local governments to implement projects for economic profit that will disrupt the natural structure of this area in the last 30 years have posed significant threats to the grove. As the last example, Üsküdar Municipality announced the 'nation garden' project in 2020, which will cause more concretisation in the grove and harm the ecological life. Thereupon, local people came together and protested this project of the municipality and started a vigil in the grove. This vigil and similar actions, which were noticed by the whole country in time, reached their goal of victory then the municipality announced on the 200th day of the vigil that it gave up on the project.

On the other hand, the local people and non-governmental organisations defending the grove have decided that the grove needs a management plan. However, since the public institutions that have legal authority over the grove such as Üsküdar Municipality were not willing to make such a plan, alternative solutions were sought and a plan team consisting of volunteer academics and experts was formed by the local people and non-governmental organizations, and the studies for the preparation of the Validebağ Grove Ecosystem Based Management Plan started in November 2021. The plan, which is expected to be completed in one year, will be the first plan of this nature prepared entirely by a civil society in Turkey.

This study was carried out to emphasise the importance of Validebağ Grove for urban forestry in Istanbul, to explain the civil society's struggle to protect the area, and to reveal the quality of the management plan made by the local people and civil society. In this context, investigations were made in the area, relevant documents and the plan being prepared were examined, and interviews were held with the local people and plan makers.

Exploring citizens' attitudes toward peri-urban forests in the era of pandemic emergency

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Keywords: *Covid 19, Italy, peri urban forests, forest frequentation, questionnaire survey*

Peri-urban forests are complex systems comprising woodlands, trees outside forests, and individual trees generally located between urban areas and rural landscapes. On the one hand, peri-urban forests produce amenity and scenic values and related aesthetic benefits. On the other hand, due to the proximity to the urban area, also provide recreational opportunities for residents. These forests are used for various kinds of recreation activities and have a positive impact on physical and psychological well-being, offering a healthy and relaxing environment for citizens living in urban areas.

Since the end of 2019, we are facing with COVID-19 pandemic and with new variants and new waves that, as it commonly happens during pandemic outbreaks, are causing severe and diverse impacts on society. One of these effects is the alteration of human-nature relations that in this case have been deeply influenced by the restrictions implemented to contain the spread of the virus.

This study is finalized to understand if citizens' behaviours and attitudes in the use of peri-urban forests are changing due to the COVID-19 pandemic. In particular, pre- and post-pandemic frequency of visit, kind of activities and attitudinal and behavioural elements that drive people to visit forest are investigated. Two peri-urban forests were chosen as study areas: the first one is in a mountain pass 8 km from Trento town in the Northern of Italy, while the second is 15 km from the urban area of Florence in Central Italy. The research – developed using a face-to-face questionnaire survey – was carried from May 2021 to September 2021. The interviews were carried out adopting a systematic sampling method and at the end of data collection, 282 questionnaires were collected and processed.

The results show that the pandemic has affected the use of peri-urban forests, but differences are revealed between the two areas. These results are probably related to the fact that spirit and attitudes towards forests of people belonging to an alpine community have been compared with people of an urban community. This means comparing people who are familiar with forests and used to mountain ecosystems frequentation and people who frequent the forest to leave the urban context.

The present investigation, developed during the era of pandemic emergency which we are still living through, offers ample space for future research and reflections.

Planting thousands of trees is great — but only if we do it right

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***Keywords:** Urban tree planting initiatives, Priority planting, Urban forest management, Urban planning, Green infrastructure, Resilience, Ecosystem services, Environmental equity*

Urban tree planting initiatives have been blooming worldwide to help address climate change and nurture healthy living environments for people. Many initiatives are characterised by ambitious targets based on the numbers of trees planted but lack of clear objectives for planting, inappropriate species and sites selection, and inadequate post-planting management hamper the success of these initiatives.

Growing an urban forest is a long-term endeavour that requires sustained commitment and support by urban communities to fully realize the provision and even distribution of multiple benefits. In this work, we propose seven principles that can help improve the success of tree planting initiatives by ensuring that the right types of trees are planted where they are needed most and where they will have the greatest impact.

These principles include: 1) stating clear management objectives and connecting these to measurable indicators to determine whether planting targets are providing the desired benefits, 2) putting the focus on tree canopy cover targets, 3) as well as survival and post-planting care through community engagement, 4) addressing the inequalities that persist in the distribution of urban tree canopy, 5) increasing species diversity, age and size diversity to enhance urban forest resilience, 6) monitoring tree losses and gains to sustain healthy urban forests and determine whether the specified objectives are being met, and 7) moving from short-term initiatives to more comprehensive and multifaceted urban forestry programs.

Furthermore, we propose a spatially explicit approach to targeting street tree plantings to the locations where trees are needed most. Criteria for prioritisation were developed in tandem with the City of Joliette, Canada, and based on nine indicators: surface temperature, tree density, vegetation cover, resilience, tree size and age, presence of species at risk, land use type, socioeconomic deprivation, and potential for active transportation.

This approach can be readily applied to other cities as these criteria can be adjusted to accommodate specific tree canopy goals and planning constraints. As cities are looking to expand tree canopy, we hope this work will assist in sustaining and growing their urban forest, enabling it to be more resilient and to keep providing multiple and sustained benefits where they are needed the most.

Uforest Alliance to promote innovation capacity among universities, cities and businesses to deliver a new interdisciplinary approach to UF in Europe

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Keywords: *Urban forest, Interdisciplinarity, Urban Forest Alliance, Knowledge Alliance, Innovation*

The negative effects on society and environment of increasing urbanization trends are of growing concern. Urban forestry (UF) can offer a wide range of solutions to mitigate these negative effects. However, urban and peri-urban green spaces are generally consciously acquired or publicly regulated spaces, which tends to slow the enhancement and provision of the potential multifunctional range of services that such spaces provide. Despite this, cities are setting challenging urban reforestation targets while struggling to face related costs and citizens engagement to meet current changing and future needs. At the same time, urban planning and forestry sciences have failed to provide interdisciplinary training to engage with innovative public-private UF initiatives and trends.

To respond to this, the Uforest Alliance, a three-year Knowledge Alliance project co-funded by the Erasmus+ Programme of the European Commission aims at promoting Europe's innovation capacity among universities, cities and businesses to deliver a new interdisciplinary approach to UF. It will do so by:

- facilitating the exchange, flow and co-creation of knowledge among universities, local authorities, and business coming from four key interdisciplinary approaches that often are not cooperating: urban landscape planning, forest ecology, socio-economics and, information and communication technologies;
- promoting a new, innovative and multidisciplinary global blended training course on UF for both students and professionals;
- stimulating entrepreneurial attitude of students, researchers and professionals to provide public and private sectors with innovative and cost-effective UF solutions.

The project will activate learning and training opportunities as well as four urban forests planting campaigns in the four (4) focus cities (Milan, Dublin, Brasov and Barcelona), therefore reaching not just learners and practitioners, but also administration, citizens and entrepreneurs. Results will have a strong EU-global dimension and transferability potential, capitalizing on existing national and international networks on urban forestry.

Growing Life Skills: Nursery Development and Tree Planting in Urban Rwandan Schools

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Keywords: *Urban Schools, Tree Nurseries, Entrepreneurship, Environmental Education, Environmental Awareness*

Despite all the known benefits, children's urban spaces – such as schools, parks, playgrounds and housing estates - are often devoid of nature and biodiversity. This is especially true in deprived urban areas, where children face additional barriers to accessing nature. A wealth of evidence shows that connection to nature can benefit children's physical, mental, social, and emotional health. Children growing up in cities are at higher risk of childhood obesity, poor mental wellbeing and air pollution damage, as highlighted by the WHO and UNICEF.

Trees for Cities (TfC) and Association des Amis de la Nature (ANA) have been partnering since 2013 to tackle this problem – with a particular focus on planting trees in urban schools across towns and cities in Rwanda. Our approach focuses on practical transformation of school grounds, alongside engaging the whole school community, including pupils, parents and the local authorities. The model of developing school-based tree nurseries has been a successful tool in increasing socio-environmental-economic impact at the grassroots level. It enables pupils to reap the obvious environmental and social benefits of sustainably growing trees from seed, but also teaches children vital life skills for the future around business and entrepreneurship.

Over the past year, the two organisations have worked together to raise over 30,000 young trees from seed across 10 urban schools in Kigali. These trees in the first instance will be planted out across each school by pupils from newly established environmental clubs. With support from ANA, trees will continue to be grown at the nursery and then be sold into the wider community, providing affordable, locally raised tree saplings for local people and a small income to the schools. This will create a sustainable source of funding towards future activities for the environmental club. The impact of this project reaches the entire school community and answers to several government priorities around education and the environment.

The approach has a range of transferable learnings to the European context – which could be adapted and applied at the community level. We look forward to the opportunity of sharing more about our learnings and successes through the historic partnership work between the two organisations.

Closing Session

LOCATION: CONGRESS HALL

DURATION: 11.30 – 12.45

Can threes help trees? Progress with implementing the 3-30-300 rule for urban forestry

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Keywords: *climate action, guidelines, planning, public health*

In early 2021, the author launched a new evidence-based guideline for greener, healthier, and more resilient cities. This 3-30-300 rule stipulates that everybody should be able to see at least 3 well-established threes from their window, live in a neighbourhood with at least 30% canopy cover, and have a public green space within 300 metres from their home. Shortly after the rule was launched on social media it went viral.

This presentation discusses the impact and implementation of this new rule to date. Several organisations and municipalities across the world have formally or informally adopted it, but what does this mean? What can explain the success of the rule and how can we ensure that it is used for the benefit of urban forestry at large? How does the rule compare to other, similar initiatives that impact urban forestry?

The importance of clear communication in urban forestry will be discussed as well, as a balance needs to be struck between complexity and simplicity, and the nuanced results of research and the call for clear guidance.

Organising institutions

The City of Belgrade, Serbia

University of Belgrade, Faculty of Forestry

European Forest Institute

Institute of Forestry Belgrade

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CLEVER Cities

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Facilitators

Belgrade, Secretariat for Environmental Protection

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